United States Department of Interior
Fish and Wildlife Service

Wildland Fire Management Plan

Red Rock Lakes National Wildlife Refuge
Lakeview, Montana

April 1, 2002

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FIRE MANAGEMENT PLAN

1.0 INTRODUCTION

1.1 General

One of the primary objectives of the U.S. Fish and Wildlife Service (Service) in managing natural areas is the maintenance of ecosystems and their dynamic processes to ensure as nearly as possible a functional natural environment. As one of these processes, fire can constitute one of the greatest influences on an ecosystem.

U.S. Fish and Wildlife Service policy requires that an approved Fire Management Plan must be in place for all of Service lands with burnable vegetation. This plan meets that requirement.

1.2 Description of Refuge

1.2.1 Location

The Red Rock Lakes National Wildlife Refuge (NWR) is located in the Centennial Valley east of Monida, Beaverhead County, in southwestern Montana (Figure 1). Lying east of the Continental Divide, the refuge is near the uppermost reach of the Missouri River drainage. Its seventy square miles (45,003 acres) of habitat comprise one of the most naturally diverse areas in the Refuge System (Figure 2). The Refuge headquarters is located 28 miles from the nearest paved road and 45 miles from Yellowstone National Park.

1.2.2 Topography and Slope

Most of the Refuge is a flat, wide valley of marsh and dry uplands lying at an elevation of 6,600 feet. The north side of the Refuge is bordered by sagebrush foothills which further north give rise to the timbered slopes of Gravelly Mountains. The Centennial Mountains (elevation 9,885 ft) border the Refuge to the south and abound with rugged cliffs and canyons, with some slopes exceed seventy percent.

1.2.3 Soils

The soils commonly found on the Refuge are extremely variable primarily due to parent material, vegetative cover, and changes in climactic conditions. Soils range in texture from loamy sand in the Breca Series to heavy clay in the Castel Series. The soils on the bottomlands are imperfectly to poorly drained and in some areas are affected by moderate to severe concentrations of salts. The better drained soils of the uplands are predominately loamy textured and contain variable amounts of gravel and stone. The soils in the mountainous regions vary considerably in depth and contain a high percentage of rock fragments in the soil profile.

Figure 1: Vicinity Map

Figure 2: Refuge Map

1.2.4 Water

Much of the valley is comprised of marsh and open bodies of water fed by Elk Springs Creek, Red Rock Creek, Tom Creek, Odell Creek, and other small streams and springs. Springs are abundant throughout the timbered slopes, grasslands and riparian areas. A footnote to Table 1 provides additional detailed information concerning the area's hydrology.

1.2.5 Climate

The climate in the Centennial Valley is characterized by long, cold winters with heavy snowfall and short, mild summers. Annual precipitation averages 21 inches with 40 percent of the total occurring as snow from October through March. The remainder is in the form of rain and occurs throughout the rest of the year. The average frost free season is only 51 days. The average dates for the first freeze range from August 13 through 22, while the last freeze falls between June 19 and July 9.

1.2.6 Vegetation

Six habitat types are represented on the Refuge and are listed in Table 1. The habitat types are identified by the dominant plants and closely tied to soil types.

The Refuge is an inter-mountain wetland complex buffered by grasslands, sand dunes and timbered slopes. There are many perennial streams and intermittent creeks that flow from the mountains (9400+ feet elevation) south of the refuge through the grassland and willow riparian areas and into the palustrine lake complex which makes up the refuge.

The persistently wet soils near the lakes creates conditions conducive of dense stands of sedge (*Carex spp.*) and rush (*Juncus spp*.). Vast stands of willow (*Salix bebbiana, S. geyeriana, S. drummondiana, S. wolfii, S. candida),* shrubby cinquefoil (*Potentilla fruticosa*), and greasewood (*Sarcobatus vermiculatus*) are abundant in portions of the floodplain near the lakes.

Timbered slopes are dominated by sub alpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), lodgepole pine (*Pinus contorta*) and whitebark pine (*P. albicus*).

Table 1. Habitat Types: Comparison of acreage figures between 1980 Grassland Management Plan, RMIS classification, and the Habitat Type Map.

1980 Grassland Mgt. Plan	Acres	RMIS	Acres	Habitat Type Map ca 1979	Acres
Shallow, fresh marsh	8,710	Palustrine	10,350	Sub-irrigated, marsh	10,115
Open fresh marsh	6,630	Lacustrine	4,420	Water	4,420
Shrub swamp (willow bog)	1,020	Riverine	1,390	not delineated on map	1,350
Native grasslands	15,786	Grasslands	22,400	Dry Uplands	22,153
Non-commercial forest	3,920	Woodlands	3,850	Timber	4,200
Brush	4,158	Brush	2,520	Brush	2,582
		Administrative	73	-- not delineated on map	75
1980 TOTAL	40,224	**2000 RMIS TOTAL**	**45,003**	Map TOTAL	44,157

RMIS - Refuge Management Information System is a new database on which future planning will be based. The 1999 RMIS figures include about 4,741 acres of land acquired since 1980. Terms such as palustrine and lacustrine is consistent with Classification of Wetlands and Deepwater Habitats of the United States (Cowardin,, et. al. 1979). Briefly, a *palustrine* system includes all nontidal wetlands dominated by trees, shrubs, and persistent emergents. The palustrine system encompasses marshes, swamps, bogs, fens, ponds, and prairies. A *lacustrine* system includes wetlands and deepwater habitats such as permanently flooded lakes and reservoirs, intermittent lakes, characterized by deeper water and considerable wave action. *Riverine* systems include wetland habitats contained within a channel, usually with flowing water but excluding wetlands created on floodplains. *Administrative* lands comprise headquarters sites. *Grasslands, woodlands*, and *brush* maintain the traditional definitions.

1.2.7 Wildlife

The Centennial Valley is composed of numerous habitat types used by a multitude of wildlife species. For example, the cliff faces harbor nesting Peregrine falcons. The mountainous pine-douglas fir type provides habitat for Great gray owls, woodpeckers, and bluebirds; security cover for bears, wolves (should they occur in the future), moose and other big game, and provide snowmelt for fisheries. Aspen foothills provide security cover and a food source for moose, nesting cavities for birds, and raptor perches. Willow bogs are year-round habitat for moose and rodents on which raptors, badgers, coyotes, and fox feed. And streams support numerous

animals such as moose, beavers, otters, fish, cranes, and waterfowl.

Within the Valley, the variety of habitats on the Refuge support a diverse fauna. Some 258 avian species have been recorded on the Refuge. Forty-two species of mammals, ten species of fish and five species of reptiles and amphibians also inhabit Refuge lands. Species range in size from hummingbirds to Trumpeter swans, and from shrews to moose. Rare species like Peregrine falcons and wolverines are present along with abundant common species such as mallards and ground squirrels. The extensive, high quality habitats on and adjacent to the Refuge, and its remote location contribute to the variety and abundance of wildlife.

The extent of the riverine influence is apparent when viewed from higher vantage points. Red Rock Lakes is predominantly a riparian Refuge and its overall habitat is viewed in this light. In the riparian zones, beaver ponds raise water tables, stabilize flows, provide pools for fish in low water and for over-winter survival, and form what may be called the riparian area's prairie pothole, as it is common to find broods of ducks on the ponds. Sandhill cranes build nests in the pool areas created by such ponds. In the northern part of the Refuge, the sagebrush-grasslands are home to foraging raptors, pronghorn, and coyotes, as well as the unique plants which give the sandhills in the valley their notoriety.

1.2.8 Threatened and Endangered Species

Red Rock Lakes National Wildlife Refuge was established in 1935 to protect the rare Trumpeter swan. Today, the Refuge continues to be one of the most important habitats or potential habitats in North America for this majestic bird and a number of other endangered and threatened species, such as the grizzly bear (*Ursus arctos horribilis*), gray wolf (*Canis lupus*), Bald eagle (*Haliaeetus leucocephalus*), and Canada lynx (*Lyns canadensis*), Whooping crane (*Grus americana*), Arctic Grayling (*Thymallus arcticus*), and Ute ladies' tresses (*Spiranthes diluvialis*). A completed listing of Threatened and Endangered Species, their habitat requirements, and the effects wildland fire may have on them can be found in Appendix A.

1.2.9 Land use

Figure 3: Red Rock Lakes Wilderness Area

Much of Red Rock Lakes National Wildlife Refuge is designated as wilderness (Figure 3). Use in the wilderness and other lands in and adjacent to the Refuge includes outdoor activities such as hunting, fishing, camping, and bird watching. Local residents operate a store-lodge and offer guided trips and other services provided by outfitters. Cattle grazing occurs on the Refuge and neighboring lands. The Bureau of Land Management manages lands adjacent to the Refuge as well.

1.2.10 Values and Improvements on and Adjacent to Station

Wildfire damage to improvements on and off the Refuge is a primary concern. While developments can generally be protected from fire damage, dispersed improvements, particularly fences, public use facilities, and gates, are likely to be damaged by severe or large fires. The Refuge has office, maintenance and visitor center facilities (est. total value $3.4 million). Other facilities located within the Refuge include improved campgrounds, gates and fences (estimated value $14.8 million).

Private facilities adjacent to the Refuge headquarters consists of several barns, bunkhouses, corrals and homes/cabins (estimated value exceeds 2,000,000)

Wildfire damage to non Service public property can occur to wooden utility poles and utility junction boxes located on or near the Refuge. Wildfires or escaped prescribed fires could damage adjacent private structures, equipment, and grazing/hay land.

1.2.11 Cultural Resources

Native Americans used the Centennial Valley as a summer hunting and foraging area for centuries. It is possible that one site located on the east side of the Refuge had been occupied since 11,000 years Before Present by Native Americans and others until 1935. This site and one other are eligible for nomination to the Register of Historic Places. Campsites such as the two referred to were located near access to water. These and other ancient campsites were used by trappers and others who followed, and have been impacted by countless disturbances. In addition to buried hearths, charcoal, bone, and obsidian found during the two site studies, the majority of the other artifacts found included broken glass and a brass cartridge casing. Scattered surface projectile points are occasionally found on Service lands.

Known homestead era sites on the Refuge include the Buck and Hanson home sites, where log homes and other structures still remain. These sites are fenced to protect the structures and grounds from the impacts of grazing, but the sites are open for visitors to explore.

The Refuge Headquarters site is on the Register of Historic Places. The site includes a residence, Headquarters office, Barn, and oil shed, all built by the CCC's of log construction. Included in the Headquarters site is the Companeros Site, which includes a hand-hued log barn and ice house.

1.2.12 Intrinsic Values, Socio-Political-Economic

About 15,000 people visit the Refuge annually, primarily to engage in various wildlife related recreation activities.

Air quality is exceptionally good, with no nearby manufacturing sites or major air pollution sources. The Refuge is a class I air shed as defined by the Clean Air Act of 1977.

1.3 Historical/Ecological Role of Fire

Very little information exists concerning the history of fire in the Centennial Valley. An on-line literature search, contact with the Beaverhead-Deerlodge Forest in Dillon, MT, the BLM Dillon Field Office, the Intermountain Research Station, University of Montana and Montana State University yielded very little fire history data for this part of Montana. A graduate student, working on fire history in the Yellowstone ecosystem will be on the refuge in early September 2001, to work with refuge staff in establishing a fire-history profile. It is obvious from observing fire scars on timber stands and age classes of timber that fire has played a role in shaping the diversity of habitats on the refuge and in the Centennial Valley.

The role that fire played in shaping the landscape in the Northern Rocky Mountains changed with changing land use at around 1900 (Agee 1993). Prior to1900, the average fire interval for the Inland Northwest Area, including the Northern Rockies, was approximately 20 years (Barrett et al. 1997). Since that time, the interval has extended greatly and sporadically. Recent fires in the Inland Northwest have been characterized by stand replacing burns rather than mixed severity fires and nonlethal underburns pre-1900 (Barrett et al. 1997).

In discussions concerning the fire history of the Centennial Valley and areas near the Centennial, it has been postulated that the fire interval in the relatively mesic Centennials was less frequent than just east of this Valley, and in the rest of the Yellowstone area (Jeremey Littell, pers. comm. 2001).

1.4 Refuge Fire History

Recent fire records (Annual Narratives and FMIS records) indicate lightning is the major cause of wildfires in the area. The largest known wildfire occurred in 1975, when a human caused range fire started off the Refuge and eventually burned 2,470 acres of Refuge lands.

Since 1985 when computerized records were first kept, six wildland fires burned 1,291 acres of Service lands and 5,503 adjoining acres (Appendix B). The average number of acres of Service lands burned was 215. This figure may be deceiving because one fire accounted for 1,180 acres. During this period, the sizes of fires on the Refuge ranged from a natural out (0.0 acres) to 1,180 acres. However, when looking at the area as a whole, during this period of time wildfires tended to be Size-Class C or larger. The Refuge averages a fire every three years, while the area averages one fire a year. The frequency and size of wildfires seems to be primarily weather related and unpredictable, but the majority occur during the June thru August period.

2.0 POLICY COMPLIANCE - GOALS AND OBJECTIVES

2.1 Compliance with Service Policy

U.S. Fish and Wildlife Service policy requires that an approved Fire Management Plan must be in place for all of Service lands with burnable vegetation. Service Fire Management Plans must be consistent with firefighter and public safety, protection values, and land, natural, and cultural resource management plans, and must address public health issues. Fire Management Plans must also address all potential wildland fire occurrences and may include the full range of appropriate management responses. The responsible agency administrator must coordinate, review, and approve Fire Management Plans to ensure consistency with approved land management plans.

Service policy allows for a wildland fire management program that offers a full range of activities and functions necessary for planning, preparedness, emergency suppression operations, emergency rehabilitation, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health.

2.2 NEPA Compliance

This plan meets the requirements established by the National Environmental Protection Act (NEPA). Regulations published in the Federal Register (62FR2375) January 16, 1997, categorically excludes prescribed fire when conducted in accordance with local and State ordinances and laws. Wildfire suppression and prescribed fire operations are both categorically excluded, as outlined in 516 DM2 Appendix 1. The Service has determined that prescribed fire activities will only be carried out in accordance with a Fire Management Plan that tiers off a land management plan that has addressed the use of fire as a management tool and has peen through the NEPA process. An environmental assessment (EA) for the Management of Upland Habitats, which addressed the use of wildland fire to achieve management objectives was completed in 1994, and a FONSI was signed on September 14, 1994 (Appendix C).

2.3 Authorities Citation

Authority and guidance for implementing this plan are found in:

- Protection Act of September 20, 1922, 42 Stat. 857;16 U.S.C. 594. Authorizes the Secretary of the Interior to protect from fire, lands under the jurisdiction of the Department directly or in cooperation with other Federal agencies, states, or owners of timber.

- Economy Act of June 30, 1932, 47 Stat. 417; 31 U.S.C. 315. Authorizes contracts for services with other Federal agencies.

- Reciprocal Fire Protection Act of May 27, 1955, 69 Stat.66.67;42 U.S.C. 1856, 1856 a and b. Authorizes reciprocal fire protection agreements with any fire organization for mutual aid with or without reimbursement and allows for emergency or major disaster by direction of the President.

- National Wildlife Refuge System Administrative Act of 1966, as amended, 16 U.S.C. 668 dd-668 ee. Defines the National Wildlife Refuge System as including wildlife Refuges, areas for the protection and conservation of fish and wildlife which are threatened with extinction, wildlife ranges, game ranges, wildlife management areas and waterfowl production areas.

- Disaster Relief Act of May 22, 1974, 88Stat. 143; 42 U.S.C. 5121. Authorizes Federal agencies to assist state and local governments during emergency or major disaster by direction of the President.

- Federal Fire Prevention and Control Act of October 29, 1974 , 88 Stat. 1535; 15 U.S.C. 2201. Provides for reimbursement to state or local fire services for costs of firefighting on federal property.

- Federal Grants and Cooperative Act of 1977, Pub. L. 95-244, as amended by Pub. L. 97-258, September 13, 1982. 96 Stat. 1003 31 U.S.C. 6301-6308.

- Supplemental Appropriation Act of September 10, 1982, 96 Stat.837.

- Wildfire Assistance Act of 1989, Pub. L. 100-428, as amended by Pub. L. 101-11, April,1989.

- Department of Interior Departmental Manual, Part 620 DM-1, Wildland Fire Management (April 10, 1998).

2.4 Other Regulatory Guidelines

Fire Management activities within the Refuge will be implemented accordance with the following regulations and directions:

- Departmental Manual Part 519 (519DM)

- Code of Federal Regulations (36CFR 800)

- The Archaeological Resources Protection Act of 1979

- The Archaeology and Historical Preservation Act of 1974, as amended

- National Historic Preservation Act of 1966

- The Endangered Species Act of 1973, as amended

- The Provisions of the Clean Air Act, as amended 1990

2.5 Enabling Legislation and Purpose of Refuge (Mission Statement)

Upon entering the Centennial Valley in 1835, Osborne Russell wrote that the Valley, from which "...flows the head stream of the Missouri..." "... was full of Buffaloe when we entered it and large numbers of which were killed by our hunters we repeatedly saw signs of Blackfeet about us to waylay the Trappers. 27th we stopped at this place to feast on fat Buffaloe" (Osborne Russell, September 1835).

The quoted passage shows that native Americans and mountain men alike used what is now Red Rock Lakes National Wildlife Refuge and the surrounding Centennial Valley of southwestern Montana. In addition to providing good seasonal trapping and hunting grounds, the Centennial Valley was a favored route between the headwaters of the upper Bighole River and the Yellowstone area. Settlers did not move into the area until 1876. Settlement brought homesteads and herds of cattle, as well as some logging and market hunting.

The long winters and great distances to market made subsistence living difficult at best, with few homesteaders remaining after the Great Depression and many selling their land back to the Federal Resettlement Administration during the 1930s. From these lands, and with the population of Trumpeter swans dwindling across the continent, President Franklin D. Roosevelt established the Red Rock Lakes National Wildlife Refuge on April 22, 1935 under Executive

> "...as a Refuge and breeding ground for wild birds and animals...". This remains the Refuge's primary purpose today. Other Acts which affect how the purpose is to be accomplished include:
>
> "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 USC 715d (Migratory Bird Conservation Act).
>
> "...suitable for- (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 USC 460k-1 (Refuge Recreation Act)
>
> "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions..." 16 USC 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)
>
> "...shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as 'wilderness areas'..." 16 USC 1131-1136, Public Law 88-577, Sec. 2, (a) (Wilderness Act) on September 3, 1964. Public Law 94-557 on October 19, 1976, subsequently designated 32,350 acres of the Red Rock Lakes Refuge as part of the Wilderness Preservation System.

Management of the Refuge has always focused on protecting a remnant population of rare Trumpeter swans. About 300 Trumpeter swans are currently in the tri-state (Idaho, Montana, Wyoming) population. Over 200 species of birds have been recorded on the Refuge with Peregrine and Prairie falcons, Bald and Golden eagles, hawks and owls, Sandhill cranes, waterfowl and Sage grouse being the most notable.

2.6 Overview of Planning Documents

This plan replaces the 1983 Fire Management Plan. The Refuge completed a Management of Upland Habitat Plan in 1994 that uses an adaptive management by prescription approach to manage upland habitats. The Comprehensive Conservation Planning process has not yet been initiated.

2.7 Land Management Goals and Objectives

The mission of the Refuge is to protect, restore, and manage the Refuge in as natural a state as possible to maintain Wilderness and Natural Area values, optimize wildlife resources, and remain consistent with the rustic back country nature of the Greater Yellowstone Ecosystem.

This Fire Management Plan is written to help achieve resource management goals and objectives

as defined in Operating Statements of the Red Rock Lakes National Wildlife Refuge. These objectives will also be reflected in the Comprehensive Management Plan presently under development.

2.7.1 Refuge Land Management Goals

Endangered, Threatened and Sensitive Species: Provide protection and habitat for endangered species such as the Peregrine falcon and Bald eagle; threatened and rare species of plants and animals; and species of concern such as the Arctic grayling and west slope cutthroat trout.

Wilderness and Natural Character: Maintain the Refuge's natural character, as indicated in the 1976 Red Rock Lakes Wilderness Law and the 1976 Natural Landmark designation, and protect archaeological and cultural resources.

Trumpeter Swans: Perpetuate Trumpeter swan recovery efforts within their historic range while maintaining a nesting level of 20 - 30 pairs on the Refuge with minimal artificial enhancement.

Wildlife Diversity: Maintain a diversity of wildlife and their natural habitats including, but not limited to: moose, pronghorns, mule deer, black bears, Sandhill cranes, Long-billed curlews, Sage grouse, coyote, fox, and a variety of raptors; ducks, geese, a wide variety of song birds, other animals and native plant life.

Habitat: Manage Refuge upland, riparian, forested, and wetland habitats for their optimum role as inter-mountain wet meadow environments and to provide appropriate diversity not commonly represented elsewhere in the Centennial Valley. Maintain plant cover and forage quality.

Recreation: Provide opportunities for necessary research and for wildlife-dependent non-commercial activities consistent and compatible with refuge goals and objectives, and provide basic, non-commercial, back country, wildlife-dependent activities where they demonstrably contribute to a conservation ethic.

Landscape Integrity: Complete the Executive Order boundary by acquiring the 15,000 acres remaining as in-holdings as opportunities arise. Look for opportunities to help maintain the integrity of other significant lands near the Refuge.

2.7.2 Selected Land Management Objectives

- G Maintain habitats for endangered, threatened, candidate or sensitive species, or species of special concern.

- G Maintain habitats for a variety of wildlife species.

- G Maintain grassland habitats in mid-seral to climax plant associations compatible with successional tendencies. Restore native grass and plant species by elimination of introduced plant species, where practical to do so. Maintain plant cover and forage

quality for a variety of wildlife.

- Manage for good to excellent riparian quality.

- Maintain forest health by reducing litter and fuel buildup and rejuvenating decadent aspen stands.

3.0. REFUGE FIRE MANAGEMENT OBJECTIVES

3.1 Overview

The goal of wildland fire management is to plan and make decisions that help accomplish the mission of the National Wildlife Refuge System. That mission is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. Fire management objectives (standards) are used in the planning process to guide management to determine what fire management responses and activities are necessary to achieve land management goals and objectives.

The primary goal is to provide for firefighter and public safety, property, and natural resource values. Service policy and the Wildland Fire Policy and Program Review direct an agency administrator to use the appropriate management strategy concept when selecting specific actions to implement protection and fire use objectives. The resulting Appropriate Management Response are specific actions taken in response to a wildland fire to implement protection and fire use objectives. With an approved Fire Management Plan, the Refuge staff may use wildland fire in accordance with local and State ordinances and laws to achieve resource management objectives (habitat improvement).

The following considerations influenced the development of the Refuge's fire management goals and objectives.

- Fire is an integral part of the Refuge's Upland Habitat Management program.

- Wildfire has the potential to negatively impact resources and improvements both on and off the Refuge.

- Positive or negative effects of prescribed fire on vegetation, and wildlife depend on burning conditions and species involved.

- Use of "minimum tool" concept will minimize resource damage.

- Rapid rates of spread and delayed fire suppression response time can create suppression problems, increasing the likelihood of escape onto adjacent lands.

3.2 Fire Management Goals

- Protect life, public and private property, habitat, and other cultural and natural resources from wildland fire.

- Use wildland fire as a management tool to accomplish resource management goals and objectives.

3.3 Fire Management Objectives

- The safety of firefighters and public is the priority objective of the program. All fire management activities will reflect this commitment.

- Protect life, public and private property and cultural and natural resources from wildfires.

- Suppress all wildland fires using strategies and tactics appropriate in light of safety considerations, values to be protected, and in accordance with Service policy.

- Restore and perpetuate native wildlife species by maintaining a diversity of plant communities through use of fire.

- Use wildland fire to invigorate desirable marsh, grass, forb, and shrub species and improve nutrition of vegetation to be used by wildlife.

- Improve forest health by utilizing prescribed fire to decreases stand density and reduce hazardous fuels buildup in the lodgepole, sub-alpine fir, and Douglas fir forest areas of the Refuge.

- Re-invigorate decadent stands of aspen by using prescribed fire to initiate new growth.

- Increase edge effect between the woody and herbaceous cover types.

- Prevent unplanned human-caused ignitions.

- Restore and rehabilitate resources lost or damaged by fire or suppression activities.

- Create an informed public regarding the role of prescribed fire within the Refuge.

4.0 FIRE MANAGEMENT STRATEGIES

4.1 General

It is the intention of the Service to manage all wildland fires occurring within the Refuge using the appropriate management response concept. Prescribed fire will be utilized under controlled conditions and defined weather variables to achieve resource management goals and objectives, including the reduction of hazardous fuel loadings.

The basic fire management strategy for the Complex will be to use the appropriate management response concept to suppress all wildfires commensurate with values at risk. Strategies employing a range of suppression options may be considered by the Incident Commander. The primary suppression strategy employed will be direct attack. However, there may be occasions when direct attack on high intensity, rapidly spreading wildland fire would jeopardize firefighter safety and not be appropriate. In these cases indirect attack will be employed utilizing natural and human-made features as wildfire control points. Minimum impact suppression techniques (MIST) will be utilized, where appropriate. Table 2 is a matrix intended to illustrate the various options available under a variety of situations to the Incident Commander.

Table 2: Appropriate Management Response

SITUATION	STRATEGY	TACTIC
1. Wildland fire on Refuge lands which does not threaten life, natural or cultural resources or property values.	Restrict the fire within defined boundaries established either prior to the fire or during the fire.	1. Holding at natural and man-made barriers. 2. Burning out. 3. Observe and patrol.
1. Wildland fire on Service property with low values to be protected. 2. Wildfire burning on to Service lands. 3. Escaped prescribed fire entering another unit to be burned.	Take suppression action, as needed, which can reasonably be expected to check the spread of the fire under prevailing conditions.	1. Direct and indirect line construction. 2. Use of natural and man-made barriers. 3. Burning out 4. Patrol and mop-up of fire perimeter.
1. Wildland fire that threaten life, property or sensitive resources. 2. Wildland fire on Service property with high values to be protected. 3. Observed and/or forecasted extreme fire behavior.	Aggressively suppress the fire using direct or indirect attack methods, holding the fire to the fewest acres burned as possible.	1. Direct or indirect line construction 2. Engine and water use. 3. Aerial retardant 4. Burn out and back fire. 5. Mop-up all or part of the fire area.

All fire management activities will be conducted in a manner consistent with applicable laws,

policies, and regulations. Fire management planning, preparedness, wildland and prescribed fire operations, monitoring, and research will be conducted on an interagency basis with involvement of all partners when appropriate.

4.2 Limits

- Smoke management will be carefully considered for all prescribed burns and will be addressed in all prescribed burn plans.

- All fires occurring on the Refuge will be staffed or monitored until declared out.

- Prescribed burning in areas where threatened, endangered, and candidate species exist will not be conducted if the prescribed fire will be detrimental to the species or any adverse impacts cannot be mitigated. Section 7 clearance will be secured, as appropriate.

- Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression except in life threatening situations without the express approval of the Refuge Manager or his/her designee.

- The use of prescribed fire to achieve management objectives must be conducted in a cost effective manner.

- Aerial Retardants and foams will not be used within 300 feet of any waterway as described in the Guidelines for Aerial Delivery of Retardant or Foam near Waterways.

- Guidelines permit the use of minimum tools to conduct management in wilderness areas. Normal routine operations will be conducted via non-motorized means to the extent practical and efficient within the Refuge's 32,350 acres of wilderness (Figure 3). Motorized equipment may be used in emergency situations.

4.3 Impacts on Neighboring Lands

Due to the current hazardous levels of live fuels and heavy accumulations of dead fuels adjacent to portions of the Refuge, a wildfire not only threatens Refuge resources, but can threaten private residences and in-holdings located immediately adjacent to the Refuge. Continuous fuels and political rather than geographic boundaries between the various landowners also means that it may be necessary to allow a wildfire to burn to a natural fuel break on lands outside the boundaries of the Refuge. Because fire known no boundaries, wildland fires originating outside the Refuge may impact the Refuge in much the same way.

Smoke from prescribed burning operations may have a short-term impact on neighboring lands. However, the majority of the prescribed burning will involved grasses and the smoke produced will be short-lived and will quickly dissipate. Smoke management considerations will also be included when determining wildfire suppression strategies and techniques.

5.0 FIRE MANAGEMENT RESPONSIBILITIES

5.1 Refuge Staff Responsibilities

The Refuge is remote and has a small staff. The Refuge Manager, with staff support, is responsible for planning and implementing an effective and safe wildland fire management program possible at the Refuge. The Refuge Manager is also ultimately responsible for all fire management decisions related to both wildfire and prescribed fire at the Refuge. The fire job responsibilities in the Fireline Handbook (PMS 410-1) and the ones described for the positions below are to be fulfilled.

5.1.1 Refuge Manager

- Responsible for the overall management of the refuge including fire management.
- Insures fire management policies observed.
- Fosters effective cooperative relations within the refuge, cooperating fire organizations, and adjoining land owners.
- Within budgetary restraints, insures sufficient collateral duty and seasonal firefighters meeting Service standards are available for initial attack.
- Certifies that prescribed fires are withing prescription.
- Approves individual prescribed fire plans.
- Serves as collateral duty firefighter, as qualified.

5.1.2 Refuge Operations Specialist (Assistant Refuge Manager)

- Supervise the resource management activities on the Refuge including the selection of objectives and tools to be used in achieving objectives (including prescribed fire).
- Responsible for planning and coordinating preparedness activities including:
  - The Refuge fire training program.
  - Physical fitness testing and Interagency Fire Qualification System data entry.
  - Coordinating with cooperative agencies on a regional level. Revising cooperative agreements as necessary.
  - Insuring the Step-up Plan is followed.
  - Managing the Fire Cache and equipment inventory accountability.
  - Prepares annual Firebase budget request and manages and tracks use of Firebase account.
- Supervises Seasonal Firefighters.
- Responsible for coordinating prescribed fire activities including:
  - Reviewing proposed annual prescribed fire program to meet resource management objectives.
  - Writing prescribed burn plans.
  - Completing daily validation that prescribed fires are under prescription and meet all other Service policy requirements.
- Maintains liaison with Regional Fire Management Coordinator and Cooperators.
- Maintains fire records, reviews completed DI-1202's for accuracy and submits them to the Zone FMO, and annually reviews and updates as necessary the Fire Management Plan.
- During the absence of the Refuge Manager, delegated the responsibility for managing the

wildland and prescribed fire programs. Annually complete the work capacity test before April 15.

- Serves as collateral duty firefighter, as qualified.
- Serves as Prescribed Fire Burn Boss, as qualified

5.1.3 Administrative Technician

- Serves as Dispatcher
- Completes all necessary administrative documents associated with fire management activities

5.1.4 Seasonal and Collateral Duty Firefighters

- Responsible for their assigned equipment and physical conditioning.
- Qualifies annually by completing the appropriate fitness test before April 15, or within two weeks of EOD date.
- Maintains assigned fire equipment in ready state and uses all issued personal protective equipment.
- Assists the Refuge Operations Specialist maintain accurate fire records by providing documentation of the experience and training they receive.
- Serves as firefighter, as qualified

5.1.5 Wildfire Incident Commander (as assigned)

- The Incident Commander (IC) is responsible for the safe and efficient suppression of the assigned wildfire.
- Fulfills the duties described for the IC in the Fireline Handbook
- Notifies the Project Manager or Dispatcher of all resource needs and situational updates, including the need for extended attack
- Ensures wildfire behavior is monitored and required data is collected and all firefighters are informed of forecasted and expected fire weather and behavior. Informs fire suppression personnel of escape routes and safety zones. Posts lookouts.
- Ensures personnel are qualified for the job they are performing
- Identifies and protects endangered and threatened species and sensitive areas according to the Fire Management Plan.
- Utilizes minimum impact tactics to the fullest extent possible.
- Ensures fire is staffed or monitored until declared out.
- Ensures that the fire site is stabilized and notifies management if rehabilitation is required.
- Submits completed DI-1202 (wildfire report), Crew time sheets, a listing of any other fire related expenditures or losses to the Project Manager, and completes taskbooks within three days of fire being declared out.

5.1.6 Prescribed Burn Boss (as assigned)

- Writes or reviews prescribed burn prescriptions for assigned blocks.
- Implements approved prescribed burn plans.
- Assist with the administration, monitoring, and evaluation of prescribed burns.
- Submits completed DI-1202 (wildfire report), Crew time sheets, a listing of any other fire related expenditures or losses to Administrative Technician, and completes taskbooks within three days of fire being declared out.

5.2 Cooperator Involvement

Along with other land management agencies, the Service has adopted the National Interagency Incident Management System (NIIMS) Wildland and Prescribed Fire Qualification Subsystem Guide, PMS 310-1 to identify minimum qualification standards for interagency wildland and prescribed fire operations. PMS 310-1 recognizes the ability of cooperating agencies at the local level to jointly define certification and qualification standards for wildland fire suppression. Under that authority, local wildland fire suppression forces will meet the standards established for their agency or department. All personnel participating in prescribed fire management activities must meet Service fitness and training standards.

6.0 FIRE SEASON

6.1 Refuge Fire Frequency

During the period 1985 thru 2000, six wildland fires were reported on Service lands and twelve additional fires were reported in the area. The Refuge averages a fire every three years, while the area, including the Refuge, averages about one fire a year. A breakdown of the Refuge's fire history can be found in Appendix B.

6.2 Refuge Fire Season

Records indicate there are two distinct time periods in which weather and fuel conditions are right for prescribed and wildfire in Centennial Valley. The first period is during late April thru late May and is generally about three to five weeks long. This period of time is before green-up of new vegetation. Available fuels are from the previous year's growth. During this period of time, fine fuel moistures can be in the single digits, Relative Humidity (RH) in the teens and wind speeds averaging 8-12 mph. Temperatures sometimes reach 75E F, but normally average between 50E- 60E F during the day. Nights are generally characterized with good humidity recovery and temperatures averaging 25-35EF.

The second period extends from July to early October and is generally 6-13 weeks in length. This is when the majority of the wildfires occur. Fine fuel moistures can be as low as 6% and it is not uncommon to have RH below 10%. Winds average 3-8 mph. Temperatures will reach into the 80's, but the average daytime temperature is 65-75EF. Nighttime temperatures average between 40-50EF. It is not uncommon to have poor humidity recovery during the night.

7.0 EQUIPMENT AND STAFFING NEEDS

7.1 Normal Unit Strength

7.1.1 Equipment and Supplies

Engines are the primary initial attack resource on the Refuge because of the predominance of fine fuels and access roads. Earth moving equipment is available, however it will only be used after approval of the Refuge Manager and when no other alternatives exist. Equipment and cache supplies are identified in Appendix D.

Engines will be fully prepared for fire suppression activities prior to the established fire season and after the possibility for hard freeze is past, usually in May. All other equipment will be stored at Refuge headquarters and may be kept in the equipment storage building during the winter months.

7.1.2 Personnel and Level of Qualifications

A team composed of permanent collateral duty and seasonal firefighters has the primary responsibility for fire suppression and prescribed fire on the Refuge. The Refuge currently does not have personnel at a level of qualification high enough to fully implement the program and must rely on outside resources, especially when conducting prescribed burns.

Due to the fuel loading, terrain, resistance to control, and distance from outside resources, the target level for Incident Commander should be ICT4. Based on the same factors and the future direction of the prescribed fire program, the target level for the Prescribed Burn Boss should be RXB2.

Fire management position needs for both suppression and prescribed fire are listed in Table 3.

Table 3. Fire Management Personnel Needs

Position	Minimum Number	Current Staffing
Incident Commander Type 4 (ICT4)	1	0
Incident Commander Type 5 (ICT5)	1	0
Burn Boss Type 2 (RXB2)	1	0

Engine Boss (ENGB)	1	0
Engine Operator (ENOP)	2	0
Fire Fighter Type 1 or Advanced FF (FFT1)	1	1
Fire Fighter Type 2 (FFT2)	3	3

An individual Firefighter can be qualified for more than one position.

A current listing of staff and level of qualification can be found in Appendix E.

8.0 PREPAREDNESS

8.1 Pre-season Readiness Activities

Table 4: Annual Refuge Fire Management Activities

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Update Interagency Fire Agreements/AOP's	x											
Winterize Fire Management Equipment										x		
Inventory Fire Engine and Cache		x										
Complete Following Year Training Analysis									x			
Annual Refresher Training					x							

Annual Fitness Testing					x						
Pre-Season Engine Preparation				x							
Weigh Engines to verify GVW Compliance				x							
Following Year Prescribed Fire Plan Preparation								x			
Review and Update Fire Management Plan											x
Prepare Pre-season Risk Analysis					x						
Live Fuel Moisture Sampling						x	x	x	x		
Weather Station Maintenance and Calibration									x		

Activities should be completed prior to the end of the month that is indicated.

8.1.1 Annual Refresher Training

The safety of firefighters and the public is the first priority. Persons engaged in fire suppression activities are exposed to a high element of risk. The Refuge Manager and fireline supervisors must make every effort to reduce the exposure to risk and enhance performance. One way is through formal and on-the-job training and improved physical fitness. The Service has adopted the training and fitness standards established in 310-1, and all firefighters must meet these and other standards established by the Service to participate in fire management activities.

All personnel involved in Fire Management activities are required to annually complete fire management refresher training in order to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Dominators. NWCG and other courses are available that meet the firefighter safety requirement; but, efforts will be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire shelter use and deployment under adverse conditions, if possible, must be included as part of the annual

refresher.

8.1.2 Physical Fitness

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region. Firefighters participating in wildfire suppression must achieve and maintain an Arduous rating. Firefighters participating in Prescribed Burns must achieve and maintain a Moderate rating. Information found in Appendix F provides specific instructions to administer the tests, a health screening questionnaire to aid in assessing personal health and fitness of employees prior to taking the test, an informed consent form, and safety considerations. A trained and qualified American Red Cross First Responder (or equivalent) who can recognize symptoms of physical distress and administer appropriate first aid procedures must be on site during the test.

Wildland fire fitness tests shall not be administered to anyone who has obvious physical conditions or known heart problems that would place them at risk. All individuals are required to complete a pre-test physical activity readiness questionnaire prior to taking a physical fitness test. They must read and sign the Par-Q health screening questionnaire, an informed consent form (Appendix F). If an employee cannot answer NO to all the questions in the PAR-Q health screening questionnaire, or is over 40 years of age, unaccustomed to vigorous exercise, and testing to achieve a Moderate or Light rating, the test administrator will recommend a physical examination. As noted below, all individuals over 40 years of age must receive an annual physical prior to physical testing.

8.1.3 Physical Examinations

In keeping with Service Policy, a physical examination is required for all new permanent employees and all seasonal employees assigned to arduous duty as fire fighters prior to reporting for duty. A physical examination may be requested for a permanent employee by the supervisor if there is a question about the ability of an employee to safely complete one of the work capacity tests. All permanent employees over 40 years of age who take the Pack or Field Work Capacity Test to qualify for a wildland or prescribed fire position are required to have an annual physical examination before taking the test.

8.2 Impacts of Regional and National Preparedness Levels on Station Activities

As indicated previously, periods of drought can greatly impact fire behavior and resistance to suppression. For that reason the Palmer Drought Index, the Keetch-Byram Drought Index, and other indicators of drought will be monitored at a minimum on a weekly bases throughout the year. All are available on the Internet at http://www.boi.noaa.gov/fwxweb/fwoutlook.htm Preparedness actions have been identified in the Step-Up Plan to respond to unusual conditions associated with drought and other factors (See following section).

Large scale fire suppression activities occurring in various parts of the country can have an impact on local fire management activities. For example, resources may be limited to implement prescribed fire activities because the closest available resources may be assigned to fire

suppression duties or Refuge personnel may be involved as well. Regional drought conditions may also tie-up local resources that would normally be able to assist with Refuge fire management activities. It may be necessary to go out of Region to get the resources needed to staff the Refuge engine during periods of extreme drought or high fire danger.

The Refuge is in the Northern Rockies Area. During National and Regional Preparedness Levels IV and V, it is necessary to receive approval from the Regional Fire Management Officer and the concurrence of the Northern Rockies Area Coordination Group to conduct prescribed burns during PL IV and the National Coordination Group during PL V. Prescribed fire activities will not be conducted when the National Preparedness is at Levels IV or V, without approval of the Regional Fire Management Coordinator and the concurrence of the Northern Rockies Area Coordination Group.

8.3 Step-Up Plan

All preparedness activities will be in accordance with the Refuge Step-up Plan (Appendix G).

8.4 Severity and Emergency Presuppression Funding

Severity funding is different from Emergency Presuppression funding. Emergency Presuppression funds are used to fund activities during short-term weather events and increased human activity that increases the fire danger beyond what is normal. Severity funding is requested to prepare for abnormally extreme fire potential caused by unusual climate or weather events such as extended drought. Severity funds and emergency presuppression funds may be used to rent or preposition additional initial attack equipment, augment existing fire suppression personnel, and meet other requirements of the Step-up Plan.

Emergency Presuppression and Severity funds will be requested in accordance with the guidance provided in the Service's Fire Management Planning Handbook. As a general guide, Severity funding will be requested if a severe drought is indicated by a Palmer Drought Index reading of -4.0 or less or a Keetch-Byram Drought Index of 600 or greater and a long-range forecast calling for below average precipitation and/or above average temperatures. Drought Indices can be located at: http://www.boi.noaa.gov/fwxweb/fwoutlook.htm.

9.0 WILDFIRE PROGRAM

9.1 Special Safety Concerns and Firefighter Safety

Safety of Service employees and cooperators involved in fire management activities is of primary concern. Only trained and qualified employees will be assigned to fire management duties. All fire management personnel will be issued appropriate Personal Protective Equipment (PPE) and trained in its proper use. No Service employee, contractor or cooperator will be purposely exposed to life threatening conditions or situations except when necessary to save the life of another person.

The primary threat to firefighter safety is from fast moving, wind-driven wildfires that can quickly over take and trap firefighters. Due to terrain and the location of various wetlands and

water courses, it may be difficult to out-run a fast moving fire. It is important that firefighter practice LCES **at all times**! Spot weather forecasts should be requested early-on during initial attack to gain insight into the possibility of shifting winds from thunderstorms, approaching fronts, and other weather related phenomena.

The Goals and Objectives of the Refuge Safety will be incorporated into all aspects of fire management. The Fire Management Plan will provide direction to accomplish safety objectives listed below during wildfire suppression actions and prescribed fire activities.

- Provide safe working conditions for employees.
- Provide safe environments for the visiting public.
- Protect and insure safety of government equipment.
- Define equipment available and:
  - identify responsibilities.
  - identify sources of resources.
  - provide documentation.
  - promote a healthy safety attitude.

Smoke from wildfires and prescribed fires is a recognized health concern for firefighters. Prescribed burn bosses and wildfire incident commanders must plan to minimize exposure to heavy smoke by incorporating the recommendations outlined in the publication Health Hazards of Smoke (Sharkey 1997).

9.2 Prevention Program

The objective of the wildfire prevention program is to:

- Reduce the threat of human caused fires through visitor and employee education.

This objective will be accomplished by:

- Integrating the prevention message into interpretive programs conducted or sponsored by the Refuge.

- Making employees aware of when high fire danger is likely to occur and what precautions can be taken during regular operations to prevent fires.

- Informing Refuge visitors of high fire danger through personal contact and posted fire danger signs.

- Carrying suppression tools and the appropriate PPE in Service vehicles during the fire season.

- Closing the Refuge to smoking and open fires, and limiting Refuge access to areas by the Refuge Manager during periods of extreme fire danger. Notices will be posted at appropriate entrances, roads and through local radio and news releases.

- Coordinating with State and other federal Land Management Agencies during periods of extreme fire danger.

9.3 Detection

The Refuge relies on neighbors, visitors, cooperators, and staff to detect and report fires. In addition, the step-up plan provides for increased patrols by Refuge personnel during periods of very high and extreme fire danger.

There may be occasions when non-fire qualified personnel discover a wildland fire. When this occurs, the employee should report the fire and request assistance before taking action to suppress or slow the spread of the fire. If the fire poses an imminent threat to human life, the employee may take appropriate action to protect that life before requesting assistance. Non-Redcarded personnel will be relieved from direct on-line suppression duty or reassigned to non-fireline duty when qualified initial attack forces arrive.

9.4 Initial Reporting and Dispatching

9.4.1 Refuge Fires

All fires occurring on the Refuge or within two miles of the Refuge will be reported by the Refuge staff to Refuge headquarters. The person receiving the report will assume duties of Fire Dispatcher and be responsible for implementing the Fire Dispatch Plan (Appendix H). For local area fires, the Fire Dispatcher will stay on duty until: (1) all Refuge resources return; (2) relieved by another dispatcher; or (3) advised by IC that he/she can leave.

The Fire Dispatcher will be responsible for filling and coordinating the delivery of any resource orders made by the IC for all operational and logistical needs, including personnel, engines, aircraft, tools, supplies, and meals.

The IC will place all resource orders through the Dispatcher, specifying what is needed, when it is needed, and where it is to be delivered. The Dispatcher will promptly determine if the resource orders can be filled or procured locally and notify the IC. If a resource order can not be filled locally, the Dispatcher will place the order with the **Dillon Interagency Dispatch Center (406-683-3975)**. The Zone FMO stationed at the Northern Rockies Coordination Center may be able to assist with ordering resources from outside the area.

A listing of communication frequencies commonly used on The Refuge can be found in Appendix H.

9.4.2 Non-Refuge Fires

Wildland fires occurring outside the Refuge's response zone will be reported to the Dillon Interagency Dispatch Center (406-683-3975). Structure fires and wildland fires occurring on private lands and other joint protection lands will be reported to the Lima Fire District (406-834-3166).

9.4.3 Out of Area Assignments

Requests for assistance by cooperators on fires not threatening the Refuge must be approved by the Refuge Manager or designee. Only qualified and properly equipped resources meeting NWCG standards will be dispatched off Refuge.

9.5 Fire Suppression

Service policy requires the Refuge to utilize the ICS system and firefighters meeting NWCG and Service qualifications for fires occurring on Refuge property. All suppression efforts will be directed towards safeguarding life and property while protecting the Refuge's resources and other values at risk from harm.

All fires occurring on the Refuge and staffed with Service employees will be supervised by a qualified incident commander (IC). If a qualified IC is not available, one will be ordered through the Dillon Dispatch Center. Until the IC arrives, the highest qualified firefighter will assume the duties of the IC until relieved by a qualified IC or the fire is suppressed. The IC will be responsible for:

- Providing a size-up of the fire to dispatch as soon as possible.
- Using guidance found in the fire Management Plan or in the Delegation of Authority, determine the strategy and tactics to be used.
- Determine the resources needed for the fire.
- Brief assigned resources on the strategy and tactics to be used, expected fire behavior, historic weather and fire behavior patterns, impacts of drought, live fuel moisture, escape routes and safety zones, and radio frequencies to be used.
- Advising dispatch of resource needs.
- Managing all aspects of the incident until relieved or the fire is suppressed.

The IC will receive general suppression strategy from the Fire Management Plan, but appropriate tactics used to suppress the fire will be up to the IC to determine and implement. Minimum impact suppression tactics should be used whenever possible. The use of earth moving equipment for suppression activities (dozers, graders, plows) on the Refuge will not be permitted without the approval of the Refuge Manager.

The number of people dispatched to the fire will depend on the time of year and burning conditions at time of response. At a minimum, two people will be dispatched. Upon arriving at the scene, all resources, including mutual aid resources, will report to the IC (either in person or by radio) prior to deploying to the fire. Mutual aid forces will be first priority for release from the fire. Procedures outlined in the dispatch section and elsewhere in this plan will be used to acquire Service and Interagency fire personnel and resources.

9.5.1 Initial Attack Strategies and Tactics

The Refuge will use the appropriate management response concept to manage wildfires. Through this concept, the full range of fire suppression strategies will be available to fire suppression personnel. The strategy selected will vary depending on firefighter safety, burning

conditions, current and predicted fire behavior and weather factors, location of the wildfire, time of year, cost, smoke impacts, and political concerns. However, until the CCP and associated NEPA document are completed, the benefits of fire will not be considered when selecting the appropriate management response.

The primary means of attack will be to use engines or hand crews to directly attack the fire or confine the fire to a specific area using natural and manmade barriers. High intensity, fast moving wildfires may require the use of an indirect attack strategy to contain the fire to a predetermined area established by the Refuge Manager in consultation with the Incident Commander. In situations where the wildfire is within predetermined boundaries and not expected to escape, surveillance may be the preferred strategy.

9.5.2 Limits to Suppression Activities

- All fires occurring on the Refuge will be staffed or monitored until declared out.

- Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression except in life threatening situations without the express approval of the Refuge Manager or his/her designee.

- Aerial Retardants and foams will not be used within 300 feet of any waterway as described in the Guidelines for Aerial Delivery of Retardant or Foam near Waterways.

- All suppression responses within the Refuge's 32,350 acres of wilderness will comply with established Wilderness Policy regulations and guidelines.

9.5.3 Escaped Fires - Extended Attack

The IC will notify the Dispatcher or Refuge Manager whenever it appears a fire will escape initial attack efforts, leave Service lands, or when fire complexity will exceed the capabilities of command or operational forces. An MOU (14-16-0006-90-918) exists between The Refuge and Lima Rural Fire District to provide fire assistance to each other when requested (Appendix I). When backup forces are needed for control of a fire, the Lima RFD will be contacted. Additional resources can be requested through the Dillon Interagency Dispatch Center (DIDC). A Wildland Fire Situation Analysis (WFSA) will be initiated to determine the appropriate management response (Appendix J).

The Dispatcher or Refuge Manager will also notify the Zone FMO. The Zone FMO will provide assistance, as available, with the implementation of the extended attack operations including:

- Assisting the Refuge Manager complete the WFSA (Wildland Fire Situation Analysis).
- Assisting the Refuge Manager complete the Delegation of Authority (Appendix J), if needed.

9.5.4 Mop up Standards and Emergency Stabilization and Rehabilitation

The IC will be responsible for mop-up and mitigating suppression impacts incurred on Refuge fires. The mop-up standards established in the Fireline Handbook will be followed. Refuge fires will be patrolled or monitored until declared out.

Prior to releasing all firefighters from a wildland fire the following actions will be taken:

- All trash will be removed.
- Firelines will be refilled and waterbars added if needed.
- Hazardous trees and snags cut and the stumps cut flush.
- Overturned sod resulting from heavy equipment use must be rolled back with a grader or by hand and compacted to preserve native grass root stock.

Other emergency stabilization and emergency rehabilitation measures may be taken in accordance with Chapter 5 of the Fire Management Handbook. Briefly:

- **Emergency stabilization** is the use of appropriate emergency stabilization techniques in order to protect public safety and stabilize and prevent further degradation of cultural and natural resources in the perimeter of the burned area and downstream impact areas from erosion and invasion of undesirable species. The Incident Commander may initiate Emergency Stabilization actions before the fire is demobilized, as delegated by the Agency Administrator, but emergency stabilization activities may be completed after the fire is declared out.

- **Rehabilitation** is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved refuge management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Rehabilitation funding can be used to begin the rehabilitation process if other funding is committed to continue the rehabilitation throughout the life of the project (beyond the initial 3 years of Emergency Rehabilitation funding). Major facilities are repaired or replaced through supplemental appropriations of other funding.

- Because of the emergency nature of the fire event, the emergency stabilization section of the Emergency Stabilization and Rehabilitation Plan (ESR Plan) must be developed expeditiously and is frequently developed by a local unit or designated burned area ESR team. The rehabilitation section of the ESR Plan is not considered an emergency, and is developed as other refuge land use plans. The refuge manager is responsible for preparing all ESR Plans. In order to be funded, ESR Plans must meet resource management objectives and be approved by the Refuge Manager and the Regional Director.

10.0 PRESCRIBED FIRE PROGRAM

10.1 Program Overview

The Refuge will use prescribed fire as a tool in two management areas - to achieve resource management objectives and to manage fuel loading. Resource management prescribed burning is used to restore, create, and/or maintain a diversity of plant communities in order to restore and perpetuate native plant and wildlife species. The Refuge may use hazard fuel reduction prescribed burns within or near Refuge development zones, sensitive resources, and boundary area to reduce the risk from wildfire damage. To the greatest extent possible, hazard reduction prescribed fires will only be used when they compliment resource management objectives.

10.1.1 Resource Management Objectives

The goal of resource management prescribed fire is to reintroduce wildland fire to the ecosystem in order to:

- Restore and invigorate native grass species.
- Maintain and rejuvenate suitable resting, feeding, and nesting habitat for waterfowl, shorebirds, neotropical, and other migratory birds.
- Periodically reduce dead vegetation that hinders new growth.
- Promote the establishment of desirable forbs.
- Rejuvenate decadent aspen stands.
- Improve forest health by decreasing stand density and fuel accumulations in stands of lodgepole pine, subalpine fir, and Douglas fir.

Achieving many of the objectives will require repeated burn cycles for an indefinite length of time. Burn frequency will vary from annually to more than 10 years depending on management objectives, historic fire frequency, weather and other natural factors, funding, and planning. On average, the Refuge plans to treat 2,000 acres annually.

10.1.2 Hazardous Fuel Reduction

The Refuge may use hazard fuel reduction prescribed burns within or near Refuge developments, sensitive resources, and boundary areas to reduce the risk from wildfire damage. To the greatest extent possible, hazard fuel reduction prescribed fires will only be used when they compliment resource management objectives. The acres to be treated are included in Section 10.1.1.

10.1.3 Wildland Fire Use for Resource Benefit (WFURB)

The beneficial impacts of wildland fire are recognized by the Refuge staff. For example, over seventy percent of the Refuge is Wilderness. Fire is an ecological process that should be allowed to take a natural role within the boundaries of the wilderness areas when conditions warrant and within constraints established by managers. However, until the CCP and associated NEPA document are completed, the use of wildland fire to achieve resource benefit will not be considered.

10.1.4 Burning Season(s)

See section 6.2 Refuge Fire Season

10.1.5 Potential Impacts

An escaped prescribed fire could erode support for the prescribed burn program, especially if neighboring private lands or improvements were impacted. An escape south of the Red Rock Pass Road could be difficult to suppress and could potentially impact neighboring federal land. The same would hold true north of Swan Lake or east of Culver Road. A limited number of structures and improvements such as fences could be destroyed. Grazing lands under permit could also be burned, impacting the grazing rotation schedule or eliminating expected forage. A prescribed burn conducted without consideration for smoke dispersal could impact air quality in the upper reaches of Centennial Valley.

10.1.6 Limits

- The County Sheriff's Office, Dillon Interagency Dispatch Center, and Lima Fire District will always be notified by the Burn Boss prior to ignition. Private landowners adjacent to the proposed burn will also be notified. The required notifications will be included in each burn plan.

- The burn will be conducted in accordance with air pollution regulations.

- Prescribed fire activities may be limited during nesting season.

- Drought can have an effect on fire severity and control. It is important to track one or more of the drought indicators. Prescribed burns should not be initiated if the Keetch-Byram Fire Danger Index is 400 or higher or the Palmer Drought Index is in "extreme drought". The drought indexes are on the Internet at: http://www.boi.noaa.gov/fwxweb/fwoutlook.htm.

- The Refuge will not ignite prescribed fires when adjacent jurisdictions or the State of Montana have instituted burning bans.

- Multiple burns will not be conducted when identified contingency forces are not available to adequately respond to an escape.

- The use of heavy equipment and other ground disturbing devices will be approved by the Refuge Manager.

10.2 Complexity

Prescribed fires conducted on the Refuge may vary from low to high complexity as determined by the Region 6 Complexity Analysis (Appendix K).

10.3 Planning

Generally, prescribed burns will be conducted in the spring and fall. The Refuge Operations Specialist is responsible for identifying units or areas in need of treatment, and for developing resource and treatment objectives for those units/areas based on Refuge resource management goals and objectives. The Burn Boss is responsible for determining if prescribed fire can be used to meet the treatment objectives. If needed, the Zone FMO or Regional Fire Management Specialist will be consulted for assistance in accomplishing the desired objectives.

Throughout the year, the Refuge Operation Specialist will be monitoring habitat and wildlife populations on Service lands. When it becomes apparent that fire would be an appropriate tool to employ in a certain situation, he will use the information to develop the annual plan. After reviewing the proposal, the Refuge Manager will decide whether to proceed with a planning effort. Guidance provided in the Fire Management Handbook will be adhered to in all prescribed burning activities on the Refuge.

As indicated, an Annual Burning Plan will be prepared according to the Region 6 format and will contain more specific information on areas proposed for burning. Fire prescriptions will be prepared for every planned habitat burn in accordance with established Service and Regional procedures.

Contingency planning is an integral part of the prescribed fire planning process, and begins with the first visit to the burn unit. It is important to identify in advance, circumstances or conditions that may require the implementation of the contingency plan. Each prescribed burn plan will include a section that thoroughly addresses the actions to be taken in the event a prescribed burn must be suppressed or managed as a wildfire.

The contingency plan will identify:

- The individual(s) who has the authority to activate the contingency plan.
- Clearly defined conditions ("trigger points") that indicate the contingency plan should be activated.
- A listing of those to be notified or contacted.
- Who assumes the duties of the Incident Commander and what are the roles of others.
- The location of values at risk and other resources requiring protection.
- The preferred strategies and tactics.
- The location of containment lines or natural fuel breaks outside the burn unit.
- The location of water refill points, staged equipment, etc.
- Contingency forces (Type, number, location).

A prescribed burn will not be implemented unless all contingency forces are confirmed as being on-site or in standby status, as specified in the plan.

At the earliest possible time, but no less than 60 days prior to the expected burn date, the prescribed fire plan for each burn unit should be completed and presented to the Refuge Manager. The burn plan will document objectives and the plan of action for achieving them, and address all requirements specified in the Service Fire Management Handbook. Burn plans can

be written by anyone but must be reviewed by a qualified burn boss prior to implementation. The plan will be reviewed in accordance with Service and Regional policy. When the plans are returned after the review, the Refuge Manager will make changes to the plan as necessary based upon the review's comments, then approve the plan.

Through out the year, the Refuge Operations Specialist and Zone Fire Management Officer will conduct informal reviews of the Refuge's fire management activities. As part of the process, all prescribed fires will be reviewed to insure that adequate support is available to conduct planned burns and that habitat management objectives were achieved. Written notes attached to the burn plan and the notes will be used to plan the next year's fire management activities.

Multiple prescribed fires may be initiated at the same time within the Refuge. A qualified Prescribed Fire Manager will coordinate multiple burns. Depending on the complexity of the burns, the Prescribed Fire Manager need not be on scene but must be readily available by phone. The maximum number of simultaneous burns will depend upon the cumulative impacts of smoke on sensitive targets and the availability of the specified equipment and personnel.

The Refuge may also assist private landowners with prescribed burning to improve the value of their land as wildlife habitat. A Wildlife Extension Agreement with a written provision for the use of prescribed fire must be approved prior to implementing burns on private lands. Such assistance is subject to guidance provided within the Fire Management Handbook, private lands program policies, Region 6 Fire Management Guidelines, and funding and staffing restraints.

10.4 Preparation and Implementation

- Preparation of prescribed burn units will be handled on an individual basis using site preparation standards identified in the burn plan for that unit.

- Preparation of fire breaks or other site work may begin at any time after a decision has been made to conduct a burn in a specific area and in consideration of the timing of such activities in relation to sensitive resource values such as breeding, feeding, and sheltering areas.

- Staff and cooperators who are to work on the burn should be notified of the burn schedule at least two weeks prior to the burn to ensure that they plan their work and leave accordingly.

- The week prior to the burn, all engines, tools, supplies, drip torches, and other items should be checked to assure that things are ready and in good working order. On the day prior to the burn date, the Burn Boss should inspect tools and equipment to be used so that unexpected shortages do not occur on the burn day and delay or prevent the planned burn activity.

- The public will be notified in advance of any scheduled burn.

10.5 Monitoring and Evaluation

The monitoring plan, which is part of the prescribed burn plan, should include provisions to document environmental and fuel conditions before, during and after the fire, and fire behavior during the burn. At the very least, the establishment of photo points will provide physical evidence to support any data that is collected. It is much better to take Robel readings and record species composition and fuel loading. The compiling of these data will give fire practitioners and resource managers data on which to evaluate if burn objectives were achieved and to refine burn prescriptions.

Fire monitoring protocols for the Region or Service will be used at the Refuge (Appendix L). Key elements to be monitored and recorded include:

- Environmental Conditions will be recorded at the site prior to ignition and periodically during the burn. Conditions to be evaluated include air temperature, RH, wind speed and wind direction.

- Fuel moisture(s) will be measured or estimated using fuel sticks, tables, charts, and/or predictive software (BEHAVE).

- Fire Behavior such as flame length and rates of spread will be recorded.

- Post fire effects will be measured or estimated. These effects include scorch height, percent of area burned, percent of fuel consumed by fuel size class (time-lag), amount of duff removed, etc.

When the fire management program proposed by this plan is fully funded, a more detailed monitoring program will be implemented.

11.0 FIRE MANAGEMENT UNITS

11.1 General

Until the CCP planning process is completed, the 45,003-acre Refuge will be considered one Fire Management Unit. The Refuge includes some pre-existing and recently acquired non-contiguous parcels totaling 920 acres directly north of the Lower Lake and near Tepee Creek. Since these tracts are close to the Refuge, they will be considered part of the Refuge Fire Management Unit.

11.2 Fire Management Objectives

- Ensure the safety of Service staff and the visiting public.
- Minimize the damage of fire and fire suppression efforts on Refuge resources by using Minimum Impact Suppression Tactics.
- Prevent fires from escaping Refuge boundaries onto adjacent private lands.
- Utilize prescribed fire when it will be useful in achieving Refuge wildlife and habitat management objectives and manage hazard fuels. On average, treat 2,000 acres annually.
- Respond to wildfires in a cost effective manner consistent with the values at risk.

11.3 Unit Strategies

The Refuge will use the appropriate management response concept to manage wildfires. Through this concept, the full range of fire suppression strategies will be available to fire suppression personnel. The strategy selected will vary depending on firefighter safety, burning conditions, current and predicted fire behavior and weather factors, location of the wildfire, time of year, cost, smoke impacts, and political concerns. The primary means of attack will be to use engines or hand crews to directly attack the fire or confine the fire to a specific area using natural and manmade barriers. High intensity, fast moving wildfires may require the use of an indirect attack strategy to contain the fire to a predetermined area established by the Refuge Manager in consultation with the Incident Commander. In situations where the wildfire is within predetermined boundaries and not expected to escape, surveillance may be the preferred strategy.

11.4 Unit Tactics

- Wildfires will be attacked using engines when possible. Roads, wetlands, and other barriers will be used where possible as primary control lines, anchor points, escape routes and safety zones.
- Burnout operations will be conducted from roads or other barriers when it is safe and effective to do so.
- Burnouts will also be used to strengthen primary control lines when it is safe and effective to do so.
- Approved fire retardant chemicals may be deployed by either air or ground forces when their use will be effective in containment, control or facility protection, and they are used in accordance with established guidelines.
- Prescribed fire operations will used a light hand on the land approach when establishing burn units and preparing the site for treatment. A full discussion of prescribed fire operations can be found in the previous section.

11.5 Habitat Types

Habitat types are discussed in Section 1.2.6 Vegetation and are summarized in Table 1.

11.6 Fuels

The predominant fuel types that can be used to predict fire behavior include:

- **Fuel Model 1 Grass** - describes areas dominated by short grass, such as saltgrass. Rate of spread of 78 chains/hour with flame lengths of 4 feet are possible under moderate conditions. This fuel model occurs on low river terraces.

- **Fuel Model 3 Grass** - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail and patches of Great Basin wildrye. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

- **Fuel Model 4 Shrub** - describes areas in which fast spreading fires involve the foliage and live and dead fine woody material. Stands of mature shrubs, 6 feet or more tall, are included. This fuel model occurs in scattered patches of mature stands of willow in the flood plain.

- **Fuel Model 6 Shrub** - describes areas where the shrub layer carries the fire at windspeeds greater than 8 mile/hour. Fire drops to the surface layer at lower windspeeds or openings in the stand. This fuel model occurs in extensive upland areas containing big sagebrush and several other species of desert shrub. Little if any fine dead fuels may be present, and the shrub layer will only carry a fire under moderate to severe windspeeds.

- **Fuel Model 8 Timber** - describes timbered areas with short-needled conifers where slow burning ground fires with low flame length are generally the case. Only under severe weather conditions involving high temperatures, low humidities and high winds do the fuels pose fire hazards.

- **Fuel Model 10 Timber** - describes areas where fires burn in the surface and ground fuels with greater fire intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch or larger limbwood resulting from over-maturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting and torching of individual trees are more frequent in this fuel situation, leading to potential fire control difficulties.

11.7 Fuel Loading and Unusual Fire Behavior

A Range Site and condition Survey was completed for the Refuge in 1987. This survey concluded Refuge grasslands consisted of 1% excellent, 50% good, 46% fair and 3% poor condition. Fuel loading is consistent with the major habitat types previously mentioned.

Fire has been excluded from the forested uplands within and adjacent to the Refuge to the extent that fuel loading is high and may exceed 10,000 pounds per acre, depending upon the site.

Wildfire behavior is variable depending on the burning conditions as reflected by the Burning Index (BI). The higher the BI, the more likely fire is to occur, the more intense fires will be, and the more extensive the fire-fighting effort will be. The U.S. Forest Service in Dillon, MT calculates the BI for use by the Refuge. **Burning index of 35 or greater in Refuge fuel types can indicate very high to extreme burning conditions** where direct attack may not be feasible. Wildfire can be dangerous and unpredictable during any season of the year, however the months of July, August, and September typically have the potential for the most severe fire behavior and the most likely period of occurrence. During these months, cool season grasses and other plants have cured out, relative humidity is generally low, temperatures are the highest of the year, wind speeds are typically high in the afternoon, and ignition sources (lightning and visitors) are common.

11.8 Expected Fire Effects

Although little site specific data on the effects of fire for Refuge exists, general conclusions can be made from the Fire Effects Information System and from data and observations of prescribed burns on similar areas. Appendix M contains a table which depicts the anticipated effects of fire on selected plant species that are found on the Refuge. Additional information can be found in Appendix A.

11.9 Limits to Strategy and Tactics

- The use of dozer or plow lines will not be permitted on Service lands except to protect life or improvements such as buildings or bridges, and only with the approval of the Project Manager or his acting.
- Hand line construction which causes soil disturbance is to be avoided, when possible.
- Retardant is not used within 300 feet of a stream or other water feature.
- It may be necessary to reduce fuel loading in some areas for fire safety reasons to reduce the risk from wildfire. In areas where this is deemed necessary, fuel reductions must compliment resource management objectives.

12.0 ADDITIONAL OPERATIONAL ELEMENTS

12.1 Public Safety

Firefighter and public safety will always take precedence over property and resource protection during any fire management activity. Firefighter safety was covered previously. This section will deal with public safety.

Due to the remoteness of the Refuge, there is very little threat to public safety from Refuge prescribed fires. Red Rock Pass and North Side roads border the Refuge but receive only light traffic. However, smoke may cross these roads and could cause a hazard. Appropriate action, such as posting warning signs, will be taken to protect the public. Prescribed burn plans will address this issue as well. During wildfires, the local law enforcement agency having jurisdiction is responsible for managing traffic hazards from smoke and other fire related impacts.

Wildfires which might escape Service lands and spread to inhabited private property are also a concern. The local law enforcement agency having jurisdiction will maintain order at the scene and enforce evacuation orders. Service personnel may assist with the evacuation process in cooperation with the law enforcement officer in charge.

12.2 Public Information and Education

Informing the public is an important aspect of fire suppression, fire prevention, prescribed fire, and the Service's mission. Information and education are critical to gaining public support for the Refuge's fire management programs.

12.2.1 Wildland Fire Suppression

During a wildfire the IC is responsible for providing fire information to the public. Also, the public must be kept appraised of burning conditions and the potential of wildfire occurrence. The IC may delegate this responsibility to another qualified individual.

12.2.2 Prescribed Fire

An informed public is a vital component of the prescribed fire program. During and immediately after, the Burn Boss will be responsible for this aspect of the program. This aspect of the operation may be delegated, as appropriate.

Areas that have been burned will present opportunities for the public to actually see the effects of wildland fire and offer staff members an opportunity to explain the purpose of the burns to the public. The following will be used to promote the prescribed fire program to the public:

- Talks in local schools.
- Attendance at local volunteer fire department meetings.
- Including the prescribed fire message in Refuge interpretive publications.
- Personal contacts with bystanders during prescribed burns.

- Developing a quantitative fire effects monitoring program and sharing the results with the public.

12.3 Annual Fire Plan Review

The Fire Management Plan will be reviewed annually by the Refuge Operations Specialist to ensure the fire program advances and evolves with the Service's and the Refuge's mission. The plan will also be reviewed following completion of the CCP process or any new habitat management plans. If the plan is changed in response to these or other changes, it will be forwarded to the Regional Fire Management Coordinator to initiate the approval process.

Revisions to the appendices, such as personnel changes, and simple pen and ink changes to the plan can be made at the Refuge during the annual review process without involvement of the Regional Office. Significant changes to the body of the plan are to be forwarded to the Regional Fire Management Coordinator for concurrence. Major revision to the FMP will require the initiation of the review and approval process by the Regional Director.

12.4 Fire Critique and Review

12.4.1 Wildfire Review

Wildfires will be critiqued by the IC and the results documented in the DI-1202. The Regional Fire Management Coordinator and/or Zone FMO will conduct formal critiques in the event of:

- Significant injury, accident, or fatality.
- Significant property or resource damage.
- Significant safety concerns are raised.
- An extended attack is necessary.

12.4.2 Prescribed Burn Review

Prescribed fires will be critiqued by the burn boss and documented in the prescribed burn plan. The Regional Fire Management Coordinator and/or Zone FMO will conduct formal critiques in the event of:

- Significant injury, accident, or fatality.
- An escaped prescribed fire occurs.
- Significant safety concerns are raised.
- Smoke management problems occur.

13.0 AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES

Because of its wilderness area, the Refuge is a Class I Scenic Area as designated in the Clean Air Act. Class I areas are afforded the greatest degree of air quality protection, very little deterioration of air quality is allowed in these area. The protection of these resources must be given full consideration. The Refuge is also a member of the Montana / Idaho Airshed Group and will follow the Montana / Idaho Airshed Group Operating Guide for all smoke related issues (Appendix N).

The management of smoke is incorporated into the planning of prescribed fires, and to the extent possible, in suppression of wildfires. Sensitive areas are identified and precautions are taken to safeguard visitors and local residents. Smoke dispersal is a consideration in determining whether or not a prescribed burn is within prescription. Generally the fine grass fuels and small burn size generate low volumes of smoke for short duration (4-5 hours).

The Refuge's fire management activities which result in the discharge of pollutants (smoke, carbon monoxide, particulate, and other pollutants from fires) are subject to and must comply with all applicable Federal, State, and local air pollution control requirements as specified by Section 118 of the Clean Air Act, as amended 1990. The State of Montana has a permit system for open burning at certain times of the year. All prescribed burning must comply with state air pollution regulations. Generally, the Zone FMO submits a list of proposed burns for the entire state each year, prior to the prescribed burning season.

Smoke from wildfires and prescribed fires is a recognized health concern for firefighters. Prescribed burn bosses and wildfire incident commanders must plan to minimize exposure to heavy smoke to 1 hour or less, at which time the employee should be rotated to a smoke free area (Sharkey 1997). The use of respirators is not recommended.

14.0 CULTURAL RESOURCES

Fire Management activities at the Refuge will be implemented in accordance with the regulations and directions governing the protection of cultural resources as outline in Departmental Manual Part 519, Code of Federal Regulations (36 CFR 800), the Archeological Resources Protection Act of 1979, as amended, and the Archeological and Historic Preservation Act of 1974. The National Historic Preservation Act of 1966, as amended, Section 106 clearance will be followed for any fire management activity that may affect historic structures or archeological resources.

Currently wildfires are suppressed. However, historical evidence demonstrates that natural and artificial fires were regular events in the mixed grass prairie. In recent years, fire suppression has resulted in a steady buildup of grassland and riparian fuel loads, colonization of disturbed soils by invading plant species, and natural vegetative growth, increasing the chances of an uncontrolled wildfire that could potentially endanger the Refuge's cultural resources as well as surrounding private property. Although over 20 years of fire ecology research allows ecologists to predict impacts on biotic communities, the possible impacts of prescribed burning (and wildfires) on archeological resources are not well known. Research conducted in North Dakota indicated that fire-related impacts to buried artifacts are negligible, but effects on surface-exposed artifacts will be significant, depending on artifact type and size (Seabloom et al 1991).

Impacts to archeological resources by fire resources vary. The four basic sources of damage are (1) fire intensity, (2) duration of heat, (3) heat penetration into soil, and (4) suppression actions. Of the four, the most significant threat is from equipment during line construction for prescribed fires or wildfire holding actions (Anderson 1983).

The following actions will be taken to protect archeological and cultural resources:

- Files and records of cultural resources should be consulted by the staff when planning prescribed burns, developing pre-attack plans, and performing other preparedness actions. The potential for adverse impacts to cultural resources will be evaluated prior to prescribed burning and in the selection of fire suppression strategies during wildfires.

- The Regional Archeologist will be contacted during the development phase of the burn plan writing process when cultural resources are suspected or known to exist in the project area.

- The Montana State Historic Preservation Officer (SHPO) will be contacted by the Regional Archeologist when it is known a planned management action may impact archeological or cultural resources. The SHPO has 30-days to respond. The Refuge will follow any programmatic archeological/cultural resources management plan that may be implemented in the future.

- Low impact wildfire suppression tactics (cold-trailing, use of foam/wet-water/water, use of natural and manmade barriers, change in vegetation, mowing, etc.) will be used to the fullest extent possible. Line construction for prescribed fire activities will follow the same principle. Maps indicating the known location of significant cultural resources will be consulted prior to laying out burn units, and whenever possible, before constructing fireline to halt the spread of a wildfire.

- Prescriptions for management ignited prescribed fires will take into account the presence of known cultural sites. Cooler fires with short residence time will be used in areas containing known cultural sites, whenever possible.

- Known surface sites will be marked, protected, and excluded from the burn, if possible. Foam will not be used in areas known to harbor surface artifacts.

- The use of mechanized equipment within the refuge must be approved by the Refuge Manager on a fire by fire basis, and the use these resources will be considered in the approval process for any planned management actions. When the use of heavy equipment is authorized, its use will be monitored.

- The location of sites discovered as the result of fire management activities will be reported by the Refuge Manager to the Regional Archeologist.

- Rehabilitation plans will address cultural resources and will be reviewed by the Regional Archeologist.

15.0 RESEARCH NEEDS

There is a need for a comprehensive fire history study in and adjacent to the Refuge to determine the role played by wildland fire in the distribution and perpetuation of local flora and fauna. This and other research should be conducted on an interagency basis, if possible, and be competed within the context of the Greater Yellowstone Area. The Refuge will continue to encourage other fire related research on Refuge lands where research operations will not conflict with resource management objectives.

Fire behavior data will be collected on all fires occurring at the Refuge. Long-term monitoring will comply with accepted scientific methods and will be funded from sources other than Fire. These data, along with information gathered through research studies, will be used to improve the effectiveness of the fire management program and be made available to those conducting research.

16.0 CONSULTATION AND COORDINATION

Consultation and coordination for the Refuge Fire Management Plan were carried out with the following individuals, agencies, publications and organizations:

Bureau of Land Management
USDA Forest Service (Beaverhead National Forest)
Montana Department of State Lands (Dillon, MT)
Montana Department of Fish, Wildlife and Parks (Bozeman, MT)
Mike Granger - FMO, Charles M. Russell NWR
Carl Douhan - Wildland Fire Planner, Contractor
Fire Management Plan -Seedskadee NWR
Fire Management Plan - Charles M. Russell
Fire Management Plan - Red Rock Lakes NWR, 1984
Upland Habitat Management EA, Red Rock Lakes NWR, 1994

The Fire Management Plan will be made available to those that have expressed an interest or may be utilized for assistance under an MOU.

17.0 LITERATURE

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APPENDIX A

THREATENED AND ENDANGERED SPECIES

A Listing of T & E Species, Their Basic Habitat Requirements, and Fire Management Considerations.

ENDANGERED:

Bald Eagle - The Refuge is used by both summer resident and migrating bald eagles. Nesting requirements are nest platforms in trees in areas free from excessive human disturbance and in the vicinity of foraging habitat. The predominant prey items used by eagles in the Centennial Valley are fish and waterfowl. The Habitat Management Plan should protect riparian areas, safeguard water quality, and maintain good waterfowl nesting habitat to provide the foraging base required by bald eagles.

The exclusion of fire has allowed timbered nest stands to become more fuel loaded, leading to a greater possibility of a stand-replacing fire should wildfire enter these stands. Fuels treatment and periodic prescribed fire during the non-nesting season would reduce this threat.

American Peregrine Falcon - The Refuge is used by both summer resident and migrating peregrine falcons. Centennial Valley nesting habitat include three hack towers and mountain cliff sites. Nesting sites should be protected from excessive disturbance. Peregrine falcons predominately prey upon small birds. Within the Centennial Valley, horned larks, shorebirds, and teal are dominant prey items. Prescribed fire should maintain some short-grass and shorebird habitats that will serve as foraging areas for peregrine falcons.

Whooping Crane - In recent years one whooping crane has spent the summer at the Refuge. This whooping crane is a product of the Gray's Lake foster rearing project. No nesting occurs on the Refuge. The lone whooper usually arrives in mid April and departs in early September. Foods of the omnivorous whooping crane includes plants, bulbous roots, snakes, frogs, mice, tadpoles, snails, slugs, worms, and grasshoppers. Prescribed fire should maintain some short-grass and marshland habitats that will serve as foraging areas for whooping cranes.

Grizzly Bear - Rare, seldom seen in the area, but presence is known. Human activity has forced the few remaining grizzlies to inhabit the forested mountain areas. This omnivorous species eats meat, fruit, grass, grubs, rodents or any edible material. Hibernates in high mountains in dens on slopes. Fuel loading of timbered slopes increases risk of stand-replacing wildland fire. Fuels treatment and prescribed fire would reduce this risk.

Gray Wolf - Infrequent visitors the area. As the population in northwestern Montana and northern Idaho expands, the potential for expansion into the Centennial Valley increases. Main habitat is timbered areas and associated grasslands. Feeds on deer, elk, moose, small mammals, and birds and other edible material. Prescribed fire would benefit by enhancing browse and grazing opportunities for native ungulates and rejuvenating grasslands for small mammals.

THREATENED:

No threatened species are known to occur on the Refuge.

CATEGORY 2 SPECIES:

North American Wolverine - Rare, occasionally seen in the forests of the high mountains and into the low foothills. This species dens in sheltered, heavily forested areas. They feed on anything available: meat, insects, eggs, berries, etc.

The exclusion of fire has allowed timbered stands to become more fuel loaded, leading to a greater possibility of a stand-replacing fire should wildfire enter these stands. In the short-term, wolverine may benefit from overly fuel-loaded areas due to increased denning sites. However, stand replacing wildland fire would negate any short-term benefits and periodic prescribed fire during the non-denning season would reduce this threat.

Northern Goshawk - This uncommon hawk has been documented as nesting in the area. The nest platform is usually found in trees about 20 to 50 feet above the ground. It inhabits deep conifer-dominated mixed forests. This hawk preys on birds and mammals as large as hares.

The exclusion of fire has allowed some timbered stands to increase tree stem density while inhibiting stem basal area. This leads to dog-hair thick stands that do not allow forested raptors to maneuver efficiently to prey on smaller birds. Fuels treatment and periodic prescribed fire during the non-nesting season would remove some of the small diameter stems.

Ferruginous Hawk - This hawk nests in the dry, open grassland areas of the Centennial Valley. Ferruginous hawks nests in short trees or on hillsides, buttes, cliffs, or rocky pinnacles. It forages in open grasslands mainly utilizing small mammals like ground squirrels but also may take birds, insects, and snakes. Prescribed fire would likely enhance prey abundance and availability.

White-faced Ibis - This marsh species has recently (since 1990) established a small (about 13 nests in 1993) nesting colony on a island in the Lower Red Rock Lake. This is the first documentation of nesting of this species in the valley. They forage for earthworms, insects, leeches, fish, frogs, etc. in the shallow margins of ponds and marshes. Prescribed fire would not affect the island nesting colony.

Mountain Plover - This locally rare species inhabits dry grassland and sagebrush habitats. They tend to nest in open areas within dry grassland habitats without much cover. Foraging on the dry grasslands, their diet consists almost wholly, if not entirely, of insects. Grasshoppers seem to be its principal food, but crickets, beetles, and flies are also eaten. Prescribed fire would likely enhance native grassland habitats and also enhance prey abundance and availability.

Black Tern - This once common nesting species has become steadily more scarce at the

Refuge, possibly due to continental declines. During the last few years, none have been documented as nested within the Refuge and few have been sighted. They nested on clumps of emergent vegetation around islands in the Lower Red Rock Lake and foraged in meadows and grassy marshes. In our area the black tern is almost wholly insectivorous, consuming a wide variety of insects including dragon flies, grasshoppers, and crickets. Prescribed fire would not affect the island nesting yet may enhance native grassland habitats and prey abundance and availability.

Trumpeter Swan - This local breeder nests upon clumps of vegetation (such as muskrat houses) within marshes. They feed almost exclusively on aquatic vegetation (some invertebrates are taken by young). Trumpeter swans spend most of their time feeding on tubers and submergent vegetation in water five feet or less in depth. Prescribed fire would not affect.

Spotted Frog and **Boreal Western Toad** - Both of these amphibian species inhabit streams, rivers, wet grasslands, marshes, mountain meadow, springs, pools, and lakes. They lay their eggs in the shallows of water bodies. The spotted frog requires cooler and more permanent waters than the boreal western toad. They seek shelter in burrows of gophers, ground squirrels, and other animals. Their diets consist mainly of insects and other invertebrates. Short-term impacts of prescribed fire may include increased sedimentation to waterbodies near burned areas. Long-term effects are probably negligible to positive enhancement of native aquatic emergent vegetation.

OTHER SPECIES OF CONCERN (MOST FROM MT STATE LIST):

Clarke's Grebe - This locally rare species has been documented as nesting in the Refuge. The nest platform is built in emergent vegetation in shallow water. The diet of this species consists mostly of fish with insects and other invertebrates and aquatic vegetation also taken.

Long-billed Curlew - This locally common resident nesting species can be found inhabiting both dry uplands and marsh habitats. They nest in relatively open areas usually close to some kind of wetland. They forage in both dry and wet habitats taking a wide variety of invertebrates and an occasional frog or toad. Sometimes they will also take berries, especially dewberries.

American White Pelican - Presently, this species does not nest on the Refuge. Usually white pelicans will build ground nests on islands. However, nonbreeding birds do spend portions of the summer at the Refuge. The diet of this species consists mainly of fish which are caught in shallow water or as the bird is swimming. White pelicans do not dive after prey like the brown pelican does.

Black-crowned Night Heron - This marsh species is a summer resident that nests at several locations within the Refuge. Nests can be either in small trees or on islands within the wetlands. Their main prey is fish but their food habitats include salamanders, frogs, and invertebrates.

Black-necked Stilt - This occasional visitor has not been documented as a nesting species on the Refuge. Where they do nest, they nest near water on mudflats, small islands , and sometimes on mats of dead vegetation. This species mainly forages in shallow water, mud flats, wet meadows and marsh areas. Their diet is primarily insects. Snails and tiny fish may also be taken.

Franklin's Gull - This gull is the most numerous within the Refuge. It nests within emergent vegetation on and surrounding several floating islands within the Lower Red Rock Lake. This species preys almost exclusively upon insects. It may also take other invertebrates like earthworms.

Forester's Tern - This tern nests within emergent vegetation on and surrounding several floating islands within the Lower Red Rock Lake. The diet of this species consists mainly of insects but may also include fish, frogs, and other small invertebrates.

Great Gray Owl - This uncommon species inhabits dense coniferous forests and has been documented as a confirmed breeder within the Centennial Valley. It hunts over forest clearings and nearby open country. Prey consists mainly of small mammals with an occasional bird.

Black-backed Woodpecker - This relatively rare species has been documented as a confirmed breeder within the Refuge. This cavity nesting species inhabits coniferous forests; often found in burnt-over areas. It forages on dead conifers looking for larval and adult insects.

Loggerhead Shrike - This uncommon species has been documented as a confirmed breeder within the Refuge. It usually builds a nest in trees. It forages in short-grass habitats and feeds upon insects and small mammals.

Lacustrine Arctic Grayling and **Westslope/Yellowstone Cutthroat Trout** - These fishes are found mostly in the Upper Red Rock Lake, Red Rock Creek, and Odell Creek. They require cool waters with good water quality. They both are spring spawners, spawning on gravel beds. Aquatic insects and crustaceans make up the bulk of the diets of these two species. Cutthroats do take smaller fish as prey. Arctic grayling rarely take fish. Winter and spawning habitat and water quality are essential components of the habitat needs of these species.

No endangered, threatened, candidate, or sensitive plant or invertebrate species are known to occur on the Refuge. However, no systematic survey has been conducted to verify the presence or absence of species of concern within these taxa. Assistance in compiling an inventory from the Montana Natural Heritage Program will be requested in the future.

Other: The following species of concern have been documented in the area by either historical records or extremely rare sightings: Fisher, North American Lynx, Pygmy Rabbit, Columbian Sharp-tailed Grouse, Burrowing Owl, Yellow-billed Cuckoo.

APPENDIX B

FIRE HISTORY 1970 Thru 2000 - RED ROCK LAKES NWR , MT

Table 1: Number of Fires and Acres Burned by Cause 1970 -1998

CAUSE	FIRES	FWS ACRES	OTHER ACRES	TOTAL ACRES
LIGHTNING	12	50.5	768.3	818.8
CAMPFIRE	0	.0	.0	.0
SMOKING	0	.0	.0	.0
DEBRIS BURNING	3	1,180.5	620.0	1,800.5
INCENDIARY	0	.0	.0	.0
EQUIPMENT USE	1	.0	700.0	700.0
RAILROADS	0	.0	.0	.0
CHILDREN	0	.0	.0	.0
MISCELLANEOUS	0	.0	.0	.0
NOT CLASSIFIED	11	3,335.0	.0	3,335.0
TOTAL	27	4,566.0	2,088.3	6,654.3

Table 2: Land Classification

TYPE OF AREA	FWS ACRES	OTHER ACRES	TOTAL ACRES
A. COMMERCIAL FOREST	.0	38.0	38.0
B. NON-COMMERCIAL FOREST	300.5	.2	300.7
C. TOTAL FOREST (A+B)	300.5	38.2	338.7
D. TTL NON-FORESTED WTRSHD	4,265.5	2,050.1	6,315.6
E. OTHER	.0	.0	.0
F. TOTAL (C+D)	4,566.0	2,088.3	6,654.3

Table 3 : Number of Fires and Acres Burned by Size Class

(SIZE CLASS DETERMINED BY TOTAL ACRES)

SIZE-CLASS BY ACRES	FIRES	FWS ACRES	OTHER ACRES	TOTAL ACRES
A. 0 TO 0.2	4	.0	.3	.3
B. 0.3 TO 9.9	3	1.0	3.0	4.0
C. 10.0 TO 99.9	6	117.0	55.0	172.0
D. 100.0 TO 299.9	6	370.0	710.0	1,080.0
E. 300 TO 999.9	7	2,898.0	1,300.0	4,198.0
F. 1000 TO 4999.9	1	1,180.0	20.0	1,200.0
G. 5000 AND OVER	0	.0	.0	.0
TOTAL	27	4,566.0	2,088.3	6,654.3

	FIRES	FWS ACRES	OTHER ACRES	TOTAL ACRES
SUPPRESSION	15	1,231.0	2,088.2	3,319.2
NATURAL OUTS	1	.0	.1	.1
SUPPORT ACTION	2	.0	.0	.0
PRESCRIBED FIRES:				
PLANNED IGNITION	9	3,335.0	.0	3,335.0
UNPLANNED IGNITION	.0	.0	.0	.0
TOTAL	27	4,566.0	2,088.3	6,654.3

Table 4: Composite Year Graph of Fire Acres for 1970 thru 1998

ACRES ARE TOTAL ACRES PER FIRE - ALL CAUSES

10-DAY RANGE: * = 18 ACRES PERIOD

PERIODS	18	180	360	540	720	900	1,080	1,260	1,440	1,620	1,800	ACRES	FIRES
JAN/01-JAN/10										.0	0		
JAN/11-JAN/20										.0	0		
JAN/21-JAN/30										.0	0		
JAN/31-FEB/09										.0	0		
FEB/10-FEB/19										.0	0		
FEB/20-MAR/01										.0	0		
MAR/02-MAR/11										.0	0		
MAR/12-MAR/21										.0	0		
MAR/22-MAR/31										.0	0		
APR/01-APR/10										.0	0		
APR/11-APR/20										.0	0		
APR/21-APR/30	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	1,770.0	3
MAY/01-MAY/10	**********	**********	**********	**********	**********	**********	**********	**********				1,240.0	2
MAY/11-MAY/20	**********	**********	**********	**********	**********	**********	**********					998.0	3
MAY/21-MAY/30												.0	0
MAY/31-JUN/09												.0	0
JUN/10-JUN/19												.0	0
JUN/20-JUN/29												.0	0
JUN/30-JUL/09	**********	**********										187.0	2
JUL/10-JUL/19	*											20.2	2
JUL/20-JUL/29	**********	**********										220.5	4
JUL/30-AUG/08	***											65.0	3
AUG/09-AUG/18												.5	3
AUG/19-AUG/28	********											153.0	2
AUG/29-SEP/07												.0	0
SEP/08-SEP/17												.0	1
SEP/18-SEP/27												.0	0
SEP/28-OCT/07	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	1,200.1	3
OCT/08-OCT/17	**********	**********										200.0	1
OCT/18-OCT/27												.0	0
OCT/28-NOV/06	**********	**********	**********	**********	**********	**********						600.0	1
NOV/07-NOV/16										.0	0		
NOV/17-NOV/26										.0	0		
NOV/27-DEC/06										.0	0		
DEC/07-DEC/16										.0	0		
DEC/17-DEC/26										.0	0		
DEC/27-DEC/31										.0	0		
TOTAL ACRES & FIRES:												6,654.3	30

APPENDIX C

NEPA COMPLIANCE

U.S. Fish and Wildlife Service Review

APPENDIX D

Normal Unit Strength

Table 1: Normal Unit Strength - Equipment

Item	Year Purchased	Percent of Fire Funding	Have	GVW	Need	GVW
Engine Module(s) heavy (500-1000 gal) medium (200-400 gal) light (50-150 gal)	1997	100%	1	12k	1	18k
Slip-on unit(s)			0		0	
Water Tender - 200 gallon			1		1	
Portable Pump(s) Standard float-a-pump			 1 0		 1 1	
Power Saw(s)						
Mower(s)						
Tractor(s)						
Grader(s)						
Plow Unit/Disk						
ATV(s)						
Other List						

Other Equipment Available for Fire Suppression or Prescribed Fire Operations Not Fire Funded
John Deere 4440 Tractor
John Deere 5200 Tractor
John Deere 670 Motor Grader
Case W24 Front End Loader

Table 2: Engine Inventory

	TYPE 6 Wildland Fire Engine Stocking List		
Category	Item Description	NFES #	Quantity
Fire Tools & Equipment	Combination Tool	1180	1
	Shovel	171	2
	Pulaski	146	2
	Backpack Pump	1149	2
	Fusees(case)	105	0.5
	Foam, Concentrate, Class A (5-gallon)	1145	1
	Chain Saw		1
	Chain Saw Tool Kit	342	1
	Portable Pump		*
	Drip Torch	241	1
Medical	First Aid Kit, 10-person	68	1
	Body Fluids Barrier Kit	640	1
General Supplies	Flashlight, General Service	69	1
	Chock Blocks		1
	Tow Chain or Cable	1856	1
	Jack, hydraulic (comply w/GVW)		1
	Lug Wrench		1
	Pliers, Fence		1
	Food (48 hour supply)	1842	1
	Rope/Cord (feet)	1041	1
	Sheeting, plastic, 10' X 20'	1287	1
	Tape, Duct	71	1
	Tape, Filament (roll)	222	2
	Water (Gallon/person)water cooler	943	1
	Bolt Cutters		1
	Toilet Paper (roll)	142	*
	Cooler or Ice Chest	557	*
	Hand Primer, Mark III	145	*
	Hose Clamp	46	1
	Gaskets (set)		1
	Pail, Collapsible	141	1
	Hose Reel Crank		*
Safety	Fire Extinguisher (5 lb.)	2143	1
	Flagging, lime green (roll)	258	*
	Flagging, yellow w/black stripes (roll)	267	*
	Gas Safety Can (5-gallon)	1291	*
	Reflector Set		*
Vehicle & Pump Support	General Tool Kit (5180-00-177-7033/GSA)		1
	Oil, Automotive, quart		2
	Oil, Penetrating, can		1
	Oil, Automatic transmission, quart		1

	TYPE 6 Wildland Fire Engine Stocking List		
Category	Item Description	NFES #	Quantity
	Brake Fluid, pint		1
	Filter, Gas		1
	Fan Belts		1
	Spark Plugs		1
	Fuses (set)		1
	Tire Pressure Gauge		1
	Jumper Cables		1
	Tape, electrical, plastic	619	1
	Tape, Teflon		1
Radio	Portable		1
	Mobile		1
	Batteries (for portable radio)		2
Hose	Booster (feet/reel)100' rolls	1220	2
	Suction (length, 8' or 10')		2
	1" NPSH (feet)100' rolls	966	3
	1 ½" NH (feet)100' rolls	967	3
	3/4" garden 50' rolls	1016	6
	1 ½" NH, engine protection (feet)		20
	1 ½" NH, refill (feet)		15
Nozzle	Forester, 1" NPSH	24	2
	Adjustable, 1" NPSH	138	2
	Adjustable, 1 ½" NH	137	3
	Adjustable, 3/4" NH	136	2
	Foam, 3/4" NH	627	1
	Foam, 1 ½" NH	628	1
	Mop up Wand	720	1
	Tip, Mop up Wand	735	2
	Tip, Forester nozzle, fog	903	*
	Tip, Forester nozzle, straight stream	638	*
Wye	1" NPSH, Two-Way, Gated	259	1
	1 ½" NH, Two-Way, Gated	231	2
	3/4" NH w/Ball Valve, Gated	739	4
Adapter	1" NPSH-F to 1" NH-M	3	*
	1" NH-F to 1" NPSH-M	4	1
	1 ½" NPSH-F to 1 ½"NH-M	7	1
	1 ½" NH-F to 1 ½" NPSH-M	6	*
Increaser	3/4" NH-F to 1" NPSH-M	2235	1
	1" NPSH-F to 1 ½" NH-M	416	1
Coupling	1" NPSH, Double Female	710	1
	1" NPSH, Double Male	916	1
	1 ½" NH, Double Female	857	2
	1 ½" NH, Double Male	856	1
Reducer/Adapter	1" NPSH-F to 3/4" NH-M	733	3
	1 ½" NH-F to 1" NPSH-M	10	4

	TYPE 6 Wildland Fire Engine Stocking List		
Category	Item Description	NFES #	Quantity
	2" NPSH-F to 1 ½" NH-M	417	*
	2 ½" NPSH -F to 1 ½" NH-M	2229	*
Reducer	1 ½" NH-F to 1" NH-M	9	1
	2.5" NH-F to 1 ½" NH-M	2230	1
Tee	1" NPSH-F x 1" NPSH-M x 1" NPSH-M w/cap	2240	2
	1 ½" NH-F x 1 ½" NH-M x 1" NPSH-M w/cap	731	2
	1 ½" NH-F x 1 ½" NH-M x 1" NPSH-M w/valve	230	2
Valve	1 ½" NH-F, Automatic Check and Bleeder	228	1
	3/4" NH, Shut Off	738	5
	1", Shut Off	1201	1
	Foot, w/strainer		1
Ejector	1" NPSH x 1 ½" NH x 1 ½ NH, Jet Refill	7429	*
Wrench	Hydrant, adjustable, 8"	688	1
	Spanner, 5", 1" to 1 ½" hose size	234	1
	Spanner, 11", 1 ½" to 2 ½" hose size	235	2
	Pipe, 14"	934	1
	Pipe, 20"		1
Personal Gear (Extra Supply)	File, mill, bastard	60	*
	Goggles	1024	2
	Hard Hat	109	1
	Head Lamp	713	1
	Gloves		*
	First Aid Kit, Individual	67	1
	Fire Shirt		*
Engine	Fireline Handbook	65	1
	Belt Weather Kit	1050	1
	Binoculars		1
	Map Case w/Maps		1
	Inventory List, engine		1

*Items listed with no minimums but are carried by engines as an option

Table 3: Cache and Individual Items. Includes items that are issued to individuals. Balance of items will be stored in cache. These Items are in addition to Engine supplies.

Category	Item Description	NFES #	Quantity for 5 person cache	Quantity for 10 person cache
Fire Tools and Equipment	Combination Tool	1180	3	6
	Shovel	‘0171	3	6
	McLeod	‘0296	3	6

Category	Item Description	NFES #	Quantity for 5 person cache	Quantity for 10 person cache
	Pulaski	‘0146	3	6
	Backpack Pump	1149	3	6
	Foam Concentrate, Class A (10 gallon/engine)	1145	20	40
	Drip Torch	‘0241	6	12
Individual Equipment	Rations (12 meals/box)	1842	1	2
	Fire Shelter w/case and liner	‘0169	6	12
	Hard Hat	‘0109	6	12
	Head Lamp	‘0713	6	12
	Goggles	1024	6	12
	Packs, Personal Gear	1855	6	12
	Line Gear	1372	6	12
	Personal First Aid Kit	‘0067	6	12
	Sleeping Bag	‘0022	5	10
	Water Bottles	‘0038	24	48
	Tent, Individual	‘0077	5	10
	Nomex Shirt (3/person+20% per size)		18	36
	Nomex Pants (3/person+20%per size)		18	36
	Leather Gloves(2/person+20%per size)		12	24
	Ear Plugs(200/box)	1027	1	1

Table 4: Firefighter Equipment List

Minimum Needs For Interagency Assignment

GOVERNMENT ISSUE:

ITEM NAME:	#:	NFES#:	GSA #:	PRICE:	
Personal Gear Pack (red)	1	1855		8465-01-141-2321	$44.07 (each)
Sleeping Bag (optional	1	0022		8465-01-119-5562	$61.06 (each)
Web Gear/Line Pack (yellow)		1	1372	8465-01-169-3996	$53.43 (each)
Headlamp (AA battery)	1	0713		(available from NIFC only)	$8.50 (each)
Extra AA Batteries		8	0030	6135-00-985-7845	$4.99 (24 pack)
Goggles	1	0300		4240-01-292-2818	$4.84 (each)
Or Safety Glasses		0475		4240-01-292-2816	$3.70 (each)
Ear Plugs		3pr.	1027	4240-00-137-6345	$16.58 (box of 200 pr.)
Leather Gloves	1	1293-7		See attached sheets for size/price information	
Fire Shelter with Poly. Liner & Case		1	0169	4240-01-121-8698	$39.26 (each set)
Canteens, 1 Quart w/cover	4	0038		8465-01-062-5854	$2.58 (each)
Individual First Aid Kit	1	0067		6545-00-656-1092	$8.70 (each)
Nomex Shirt & Pants		3 sets		See attached sets for size and price information	
Compass		1	1814	6605-00-553-8795	$12.07 (each)
Fireline Handbook		1	0065	(available from NIFC only)	$2.85 (each)
Fireline Handbook Supplement	1	2165		(available from NIFC only)	$0.51 (each)
Safety Helmet with Chin strap	1	0109		8415-01-055-2265	$9.00 (each)
Leather Boots, Minimum 8" high with non-skid lug soles				Available from local vendors	
(boots MUST be leather, no rubber, gore tex ect., they MUST be a minimum of 8 inches high, and have hard vibram lug soles (no smooth or soft soles allowed). Refuges are authorized to spend up to $200.00 per employee for required fire boots. Make sure employees have broken in the boots prior to dispatch!)					
Small Signal Mirror		1	1138	6350-00-261-9772	$5.19 (each)
Parachute Cord, Nylon	50'	0533		4020-00-240-2146	$63.98 (SL)
(This comes in a 700 yard roll (SL), I have one and can send you whatever you need!)					
Meals, Ready To Eat (MRE)		1	1842	8970-00-149-1094	$73.01 (box)
(Packaged 12 MRE's per box)					
Tent, 2 Person (optional)	1	0077		(available from NIFC only)	$91.92 (each)
Flagging, orange	1	2398		9905-00-194-9698	$0.73 (RO)
Insect Repellent	1	0705		6840-01-003-9589	$1.06 (BT)
Blanket, Space	1	1114		7210-00-935-6667	$4.58 (each)

EMPLOYEE RESPONSIBILITY (red bag): *****Bring sufficient quantities to last for a 21 day detail*****

Socks, Shorts, Sweatpants
Underwear (100% cotton if possible)
T-shirts (always wear one under your Nomex shirt while on the fireline, 100% cotton only)
Bandanas
Rain Coat/Poncho
Warm Jacket, heavy sweatshirt or similar item
Tennis Shoes
Toilet kit and small towel
Sheet of plastic or ground cloth/tarp
Watch
Pocket Knife
Money, at least $50.00 in cash
Medication if required
Personal items (hygiene)

OPTIONAL BUT HIGHLY RECOMMENDED ITEMS:

Alarm Clock, Sunscreen, Chapstick, Foot Powder and Moleskin, Extra Glasses or Contacts and Sunglasses

Wool Hat and Gloves, Extra Boot Laces, Books and other Reading Materials, Deck of Playing Cards, Notebook, Stamps and Letter Writing Supplies & Phone/Address Book

OTHER RULES AND SUGGESTIONS:

1. Any clothing you plan to wear on the fire line must be made of natural fibers such as cotton and wool. Do not use synthetic fiber clothing as these materials have a much lower ignition temperature and will melt causing much more severe burns.
2. You are limited to a total of 65 pounds maximum weight of gear in your red bag (45) and line pack (20), keep your canteens empty until you arrive at the incident check-in area.
3. Travel in Nomex shirt/pants and boots to reduce pack weight.
4. Save a clean change of clothes for the return trip, or pack one non-Nomex shirt and a pair of jeans. If you can fit it in, a pair of shorts and sweat pants will be very nice to have for time spent in fire camp.
5. Pack everything in plastic bags! All toiletry items should be in Zip Loc bags and clothes in garbage bags. You never know where your red bag will be stored while you are away on the fire.
6. Clearly label your personal gear bag (red pack) and line gear with your name and home unit address/phone number. All gear looks the same in a fire camp.
7. Do not bring valuable personal items such as camera's and tape players. If they are lost or stolen you may not be compensated for them. Inexpensive or disposable camera's work just fine.
8. If you find you can not get everything into your two bags that you need, leave your sleeping bag behind. You can usually pick one up in fire camp.
9. Carry your line gear (yellow pack) on the plane as carry on luggage. This way you will be ready for fireline duty even if your red bag gets lost on the way.

APPENDIX E

Current Employee Qualifications

August 2001

NAME	POSITION	QUALIFICATIONS
Danny Gomez	Refuge Manager	FFT2
Tom Reed	Refuge Operations Specialist	FFT1
Jackie Vaughn	Administrative Assistant	Pending FFT2
David Olson	Wildlife Biologist	FFT2
Howard Begin	Maintenance	None
1-3 Seasonals	Range Technician/Firefighter	FFT2

ENOP - Engine Operator
FFT1 - Firefighter Type 1
FFT2 - Firefighter Type 2

APPENDIX F

FITNESS

Job-Related Work Capacity-Tests for Wildland Firefighters

Background Studies of wildland firefighting clearly show the link between fitness and work performance. Fit workers can do more work with less fatigue, and still have a reserve to meet unforseen emergencies. They perform better in a hot environment, and recover faster from adverse firefighting conditions like long shifts and reduced rest. In short, fitness is the most important factor in work capacity.

Since 1975 Federal Agencies have used a 5-minute step test and an alternative 1.5 mile run test to screen candidates for wildland firefighting. In 1994 the Missoula Technology & Development Center (MTDC) began a review of work capacity testing alternatives. MTDC conducted a comprehensive job task analysis and extensive laboratory and field studies of candidate tests. The result is a family of job-related field tests.

Work Category	Test	Distance	Pack	Time
Arduous	Pack Test	3 Miles	45 lbs	45 min
Moderate	Field Test	2 Miles	35 lbs	30 min
Light	Walk Test	1 Mile	none	16 min

Pack Test The test consists of a 3 mile hike with a 45 pound pack (fire-suppression water bag) over level terrain. A time of 45 minutes, the passing score for the test, approximates a step test score of 45 (ml/kg.min), the established standard for wildland firefighters. The test is a valid, job-related test of the capacity for arduous work, defined as: "Duties involve field work requiring physical performance calling for above average endurance and superior conditioning. These duties may include an occasional demand for extraordinarily strenuous activities in emergencies under adverse environmental conditions and over extended periods of time. Requirements include running, walking, climbing, jumping, twisting, bending, and lifting more than 50 pounds; the pace of work typically is set by the emergency condition." The energy cost of the test is similar to that demanded on the job. The Pack Test is correlated to measures of aerobic and muscular fitness, as well as performance in field tasks such as working with hand tools, or carrying loads over rough terrain. The duration of the test insures the capacity to perform prolonged arduous work under adverse conditions, with a reserve to meet emergencies.

Field Test A 2 mile hike with a 25 pound pack in 30 minutes, approximates a step test (max V02) score of 40. A job-related test of work capacity designed for those with moderately strenuous duties: "Duties involve field work requiring complete control of all physical faculties and may include considerable walking over irregular ground, standing for long periods of time, lifting 25 to 50 pounds, climbing, bending, stooping, squatting, twisting, and reaching. Occasional demands may be required for moderately strenuous activities in emergencies over long periods of time. Individuals usually set their own work pace.

Walk Test This one mile walk test approximates a step test score of 35 is a test to determine the ability to carry out light duties: "Duties mainly involve office type work with occasional field activity characterized by light physical exertion requiring basic good health- Activities may include climbing stairs, standing, operating a vehicle, and long hours of work, as well as some bending, stooping, or light lifting. Individuals almost always can govern the extent and pace of their physical activity."

Instructions

The Pack Test is a 3 mile hike with a 45 lb pack over level terrain. Field studies show . that performance on the pack test is significantly related to performance of firefighting tasks, including line construction with hand tools. Studies conducted at the University of Montana Human Performance Laboratory indicate that the energy cost of the test is similar to the cost of firefighting tasks. A score of 45 minutes on the Pack test approximates a Step Test Score of 45 (ml/kg-min). Because of its length, the Pack Test is an excellent indicator of sustained work capacity. Scores on a flat course are highly related to performance on a hilly course. And performance on the Pack Test is significantly related to vascular fitness, including measures of upper and lower body strength. The Pack Test is: job-related, safe, inexpensive, and easy to administer. It is a valid, reliable, and objective measure of work capacity that does not adversely impact workers on the basis of gender, ethnicity, age, height, or weight. **(These instructions apply to the Field and Walk Tests).**

The course

Course must be essentially level and have a firm, relatively smooth walking surface. Course length (3 miles) must be accurate: double-check measurements. Use a measuring wheel or a calibrated bicycle computer. Vehicle odometers are not sufficiently accurate.

Loop or out-and-back courses are preferable. Avoid one-way courses where unfavorable conditions (wind, grade) are not offset. A moderate grade (2-3%) is acceptable if the course starts and finishes at the same place. Have lap counters available for multi-loop courses. Use course monitors when needed.

Candidates must be informed of the course layout (use a map or sketch of the course). Use distance markers (e.g., at 1 or 1.5 miles) to aid candidates. Use hazard and traffic makers as needed.

Equipment

Packs: The 5 gallon backpack pump water bag (NSN8465-01-321-1678, cost $35.23) used in test development is recommended: The number required will depend on the number of candidates to be tested simultaneously. If other packs are used the test administrator must insure the correct weight (45 lbs).

Pack liners: (NSN8465-01-321-1679, cost $6.51): Have at least one extra liner for each pack.

Canteens:(NSN8465-00-102-6381, cost $0.43): Use up to 2 in pack pocket to obtain proper weight (45 +/- 2 lbs).

Safety Vests/Route Markers: As needed.

Distance Markers: Use mile and mid-point markers so candidates can maintain proper pace.

Stop watches: Utilize 2 watches to provide back-up timing.

Vehicle: Bicycle or other vehicle to monitor candidates on the course.
Radios: As needed for monitoring and safety.

Scale: An accurate hanging style spring scale is recommended for weighing packs.

Forms: **PAR-Q** health screening questionnaire and an informed consent form (attached).

Data collection form (should include: site, date, conditions, test administrator, and columns for name, gender, age, height, weight, Pack Test and other scores - step test, 1.5 mile run, etc.).

Test Administration

One person can administer the test when:

The administrator is a trained First Responder (American Red Cross) or equivalent.
The timer can monitor the course.
The safety/med evacuation plan can be executed.
Five or fewer people are being tested at. one time.
Candidate safety and compliance with test requirements can be assured.

For larger groups or when course monitoring is difficult, a 2 to 3 person team should be used.

Testing Tips

Fill packs the night before to check for leaks (use plumber's Teflon tape to stop leaks in threaded fitting).

Weigh bags before test. Check weight after the test if necessary. Note: Bags are used without trombone pumps.

Group or staggered starts can be used. Many candidates will benefit from the support provided by a group start.

Environment: Administer the test in moderate environmental conditions; do not test new recruits when the temperature is high or when the temperature and humidity combine to create high heat stress conditions (see heat stress chart); if necessary, test early in the day to avoid high temperature /humidity combinations; avoid high winds that may affect performance.

Hydration: If the weather is hot, encourage candidates to drink fluids prior to the test, and provide fluid replacement mid way in the course. Candidates may carry a water bottle.
Altitude: Use this chart to adjust for test~.administered at elevations above 4,000 ft.

Table I: Altitude Corrections for Work Capacity Tests*

Altitude	Pack Test	Field Test	Walk Test
8-9,000 ft	90 sec	60 sec	30 sec
7-8,000 ft	75	50	25
6-7,000	60	40	20
5-6,000	45	30	15
4-5,000	30	10	10

* Add correction to required test time (e.g., Pack Test at 6-7,000 ft, add 60 seconds to test

standard (45 min) for altitude adjusted standard of 46 n-dn.

The altitude adjustment assumes that the candidate has had an opportunity to acclimate to the altitude of the test site. If a candidate doesn=t meet the required standard, even with the adjustment, he or she should be encouraged to train at the altitude and retake the test.

Instructions for Candidates

In advance of test: Distribute confidential PAR Q physical activity readiness questionnaire so candidates can decide if they should seek medical advice before taking the test. Have candidates read and sign an informed consent form.

Clothing: Candidates may select the clothing worn during the test. "T" Shirts and shorts are acceptable. Footwear that provides ankle height support, such as hiking boots or ankle height sport shoes, is required for the Pack and Field tests, and recommended for the walk test.

Safety: Brief candidates on the test, the course, safety considerations, and accommodations. Tell candidates to terminate the test if they experience major physical problems or discomfort, or feel the need to terminate for any reason.

Pace: Demonstrate to candidates how they should hike (power walk) the course as fast as possible without jogging. The heel of one foot must make contact before the opposite toe leaves the ground. jogging or running will invalidate the test and require a retest.

Accommodations: Candidates may use gloves or other padding to make the pack more comfortable. A candidate-provided walking staff may be used during the test.

Hydration: If weather is hot, tell candidates to drink plenty of fluids prior to the test. Candidates may elect to carry a water bottle, but the extra weight will not be counted as part of the pack weight.

Essentials of Good Testing

*An accurately measured flat course with good surface.

* Proper weight packs. Use the specified water bags and verify pack weight with a calibrated scale. If alternative packs are used encourage candidates to adjust them properly.

* Duplicate and accurate timing. Give candidates split times along the course (e.g., at one mile or the mid point - 1.5 mile for Pack Test).

* Candidates should be rested and well informed about the course and the need to maintain a fast pace.

* Favorable environmental conditions. Avoid adverse conditions.

*Complete the PAR Q physical activity readiness questionnaire and sign an informed consent form.

Safety

A locally developed safety/med evacuation plan must be prepared for the course.

Test administrator(s) must be familiar with the safety plan.

A trained and qualified American Red Cross First Responder (or equivalent) who knows the symptoms of physical distress and appropriate first aid procedures must be on site during the test.

Avoid use of roads and intersections ' where traffic is a problem ' or concern. When using roads, use traffic control devices and traffic controllers in hi-visibility vests as needed.

Require candidates to read and sign the PAR Q health screening questionnaire and an informed consent form.

Check to see that candidates are wearing proper (above ankle) footwear.

Encourage candidates to stretch and warm up prior the test.

Do not test tired or injured individuals, or test during conditions that could compromise health or safety.

Monitor candidates to identify those having difficulties and encourage them to terminate the test if necessary.

Encourage fluid intake and replacement and provide fluids in route when . heat stress conditions (temperature /humidity) exist.

At the mid-point, terminate those who are substantially behind the required pace (22.5 minutes for 1.5 miles and/or are having difficulty maintaining the pace. Candidates cannot jog or run to make up time.

Encourage a cool down with an easy walk after the test. Monitor the recovery of candidates who appear exhausted or distressed.

Recommend several weeks of training before retaking the test.

Training for the Pack Test

Begin at least 4 to 6 weeks before you report for duty. Train by hiking or power walking, using the ankle height footwear you will use in the test.

- $ Hike a 3 mile flat course without a pack. When you can cover the course in less than 45 minutes;
- $ Add a pack with about 25 pounds to your training hikes;
- $ Increase the pack weight until you can hike 3 miles in 45 minutes with a 45 pound pack. Also:
    - $ hike hills (w pack) to build leg strength and endurance
    - $ jog the flat course (w/o pack) to build aerobic fitness
    - $ hike/jog over distance for stamina
    - $ engage in cross-training (mountain biking, weight lifting).

Finally, do job-specific tasks and training to become work hardened for the coming season. Wear work boots on extended hikes. Work with hand tools to prepare trunk and upper body muscles for prolonged work. Work hardening insures that the hands, feet, muscles, tendons and ligaments used on the job are tough and ready to go.

Informed Consent Work Capacity Tests 2/97

Pack Test intended for those involved in arduous duties (defined as requiring a max V02 of 45, lifting more than 50 pounds and occasional demand for extraordinarily strenuous activities). The 3 mile test with a 45 pound pack in 45 minutes is strenuous, but no more so than the duties of wildland firefighting.

Field Test intended for those with moderately strenuous duties (requires a max V02 of 40, lifting 25 to 50 pounds, and occasional demand for moderately strenuous activity). The 2 mile test with a 25 pound pack in 30 minutes is fairly strenuous, but no more so than field duties.

Walk Test intended for those whose duties involves light work with occasional field activity (required max V02 of 35). The -1 mile walk in 16 minutes is moderately strenuous, but no more so than the duties assigned.

Risks: There is a slight risk of injury (blisters, sore legs, sprained ankle) for those who have not practiced the test. If you have been inactive and have not practiced or trained for the test, you should engage in several weeks of specific *training before* you take the test. Be certain to warm up and stretch before taking the test, and to cool down after the test. The risk of more serious consequences (e.g., respiratory or heart problems) is diminished by completing the PAR Q physical activity readiness questionnaire.

If you cannot answer NO to all the questions in the PAR Q health screening questionnaire, or if you are over 40 years of age and unaccustomed to vigorous exercise, you should contact your physician, by phone or in person, before you take the test. Your physician may want to see PAR Q and information about the test or job demands.

1. I have read the information on this form and understand the purpose, instructions, and risks of the job-related work capacity test.

2. I have read, understood, and truthfully answered the PAR Q physical activity readiness questionnaire.

3. I believe I have the ability to complete the test and carry out the assigned duties of the position (e.g., wildland firefighter).

4. I assume responsibility and release the US Government from liability for injuries sustained in testing that result from any physical or mental disorders.* * Reference EEOC #915.002,5/19/94

Test (circle) Pack Field Walk

Signature_____ Date

Print Name

Witness

QUESTIONS AND ANSWERS
"PACK TEST"

1. **why are we** changing from the Step Test and 1 1/2 mile run?

   ANSWER: The Step Test has been used since **1975 by Federal land management** agencies. New Laws (Americans With Disabilities Act), field experience and research on long-term work capacity caused us to reevaluate the current tests. In 1990 the Service-Wide Civil Rights Action Group requested the Forest Service Fire and Aviation Management staff to evaluate the Step Test. They believed that it discriminated against people who should be able to participate in fire activities. The Missoula Technology and Development Center (NMC) was assigned the work of assessing the technical and legal aspects of the Step Test and 1 1/2 mile run. The appropriateness of the physical fitness standard for fire suppression positions was evaluated by the National Wildfire Coordination Group (NWCG). The conclusions were:

   The Step Test and 1 1/2 mile run do not meet Federal requirements of testing employee fitness (Federal Uniform Standards for Employee Selection Procedures).

   The Step Test and 1 1/2 mile run are not performance related and are therefore not appropriate tests.

   Many of the fire position physical fitness standards were not required in order for incumbents to perform the duties of the positions. The fitness requirement were eliminated for many positions and were revised for others in the 1993 revision of the Wildland Fire Qualification Subsystem used by NWCG. (See Summary of ICS Physical Fitness Requirements attached to this document.)

   The post-exercise heart rate count used in the step test is difficult to perform accurately thus giving incorrect fitness assessments for some employees.

2. What is the objective of fitness testing/ the "Pack Test"?

   ANSWER: Fitness testing was introduced to the process of selecting wildland fire personnel to help reduce the number of heart attacks and other physical fitness related illnesses and injuries experienced by firefighters. Specifically, fitness testing is to determine if a person has the minimum levels of aerobic and muscular fitness to perform the tasks associated with their assigned fire suppression positions safely and effectively.

3. Did line management participate in the decision to utilize the "Pack Test"?

   ANSWER: The direction for Fire and Aviation Management to review the Step Test in response to the Service-wide Civil Rights Group came from Dale Robertson, Chief of the Forest Service at that time. The action plan for the review was accepted by the Chief. A 5100 memorandum dated May 29, 1996 signed by John Chambers acting for the Director of Fire and Aviation Management went to all Regional Foresters and Area Director requesting review and comments. The letter explained that the "Pack Test" was proposed to replace the existing tests and giving the history and rationale leading to the "Pack Test".

4. Why was the "Pack Test" chosen?

   ANSWER: The enclosed materials contain the details but the general reasons are:

The existing tests were not appropriate in terms of what they were established to evaluate or with respect to legal requirements and the "Pack Test" was developed to meet those criteria.

The "Pack Test" development followed the Federal Uniform Guidelines for Employee Selection producers beginning with a Job Task Analysis for Wildland Firefighting.

The "Pack Test has "energy costs" similar to tasks performed on the fireline. It is significantly correlated to laboratory measures of aerobic and muscular fitness and to performance on field tasks.

Statistical analyses of the data from field tests run on 333 firefighters show no "adverse impact" for gender, ethnicity, age, height or weight based on the Equal Employment Opportunity Commission (EEOC) standard.

5. Are all state and contractor personnel required to take the "Pack-Test"?

ANSWER: The Forest Service requires all contractors' personnel to meet the fitness standard used by the Forest Service. After January 1, 1998, contractors personnel employed by the Forest Service will have to pass the "Pack Test" if required by the position filled. All agencies have the flexibility to establish the appropriate physical fitness test(s) for their personnel under the ICS 310-1, Wildland Fire Qualification Subsystem Guide.

By agreement, all NWCG members (includes the states) accept each others' personnel based on the certification used by the respective members.

6. Was there a control group for the "Pack Test@? What was its makeup? What statistical information is available?

ANSWER: Yes, the attached information prepared by Dr. Sharkey describes the design of the project and details the steps involved.

7. Is the "Pack Test" gender neutral?

ANSWER: Yes, Dr. Sharkey's information describes the testing, the analyses of the data obtained and the conclusions relative to "adverse impact" defined by EEOC.

8. Is the "Pack Test" equally effective in testing the fitness of a 200-pound firefighter and a 120-pound firefighter (45 pound pack requirement for Arduous)?

ANSWER: Yes, Dr. Sharkey's information shows no "adverse impact" based on firefighter weight.

9. Were fire medical records reviewed to ensure that the "Pack Test" is the correct test to prevent injuries/illnesses resulting from inadequate fitness levels?

ANSWER: The goal of work task related testing is to subject employees to testing that represents tasks they would routinely perform on the job. The task analysis identified those kinds of tasks. The development of the two alternative tests that were analyzed was based on the tasks identified. The "Pack Test" is not and was not intended to replace an intensive physical examination which could evaluate the myriad of physical and medical parameters and conditions to "ensure" accident/illness prevention. It is a screening that can be done by the agencies at a reasonable cost which will identify employees who do not have the muscular and aerobic fitness required to safely and effectively perform the tasks required of them fighting fire.

10. Was a medic physician advisor consulted during the development of the "Pack Test"?

ANSWER: Yes, Dr. Sharkey's educational and experience background is enclosed. Fitness, human performance and testing have long medical related histories. Dr. Sharkey, as a professional Human Performance/Exercise Physiologist has incorporated the pertinent background and technology in the development of the "Pack Test". The "Pack Test" has been formally presented to the Occupational Physiology and medicine section of the American College of Sports Medicine in 1994-95 and 96.

11. How/why was the 45 pounds determined to be the weight for the Pack Test?

ANSWER: Early in the project to evaluate the Step Test and 1 1/2 mile run, fire program managers in the federal agencies were polled to determine the critical tasks required of firefighters. Responses showed a high need for firefighers to be able to carry heavy packs such as hose bags, pumps and 5 gallon waterbags. The 5 gallon waterbag was chosen because it fit the identified task and it is commonly available.

12. Were Demographics of the f ire organization (red carded employees)reviewed in the development of the "Pack Test"?

The Wildland Fire fighter Job Task Analysis included input f rom all Federal agencies from all geographic areas of the United States. The field testing done to evaluate the Pack Test included statistically valid numbers representing gender, ethnicity, age, height and weight.

13. Has the test protocol been reviewed by medical doctors? With what results?

ANSWER: All phases of test development have been reported at the Occupational Medicine and Physiology Research section of the American College of Sports- Medicine for peer review and feedback- We have consulted with researchers at the U.S. Army Environmental Medicine Laboratory in Natick, and with physicians and physiologists in Canada, Australia and New Zealand. The "Pack Test" has received favorable comments and has caused some to reevaluate their approaches.

14. Define and explain the energy expenditure formula of the Pack Test.

ANSWER: The pack weight and required pace (4 MPH) were determined in laboratory studies to approximate the average energy cost of fireline duties, 22.5 ml of oxygen per kilogram of body weight. The previous fitness standard (45 ml) was based on that energy cost. Correlation analysis of treadmill oxygen intake (max V02), step test and the 1 1/2 mile run score of 45 ml/kg/minute. That indicates that the "Pack Test" does not "raise the barn. it does show that an individual has the capacity to sustain the energy cost of firefighting duties - at least for 45 minutes.

15. Administering the "Pack Test" to 1200 to 1300 firefighters is a huge investment in time. Additionally there is a concise period of time (window) in which they can be done. Are there recommendations on how this can best be accomplished?

ANSWER: Using the "Pack Test" does require an investment of time and energy but the benefits of screening employees who do not have the aerobic or muscular fitness to safely perform firefighting duties out weigh the drawbacks. our commitment is to perform our work safely and the screening is a small price to pay. Firefighters have been outspoken about the inadequacy of the current fitness testing (TriData Phase I report of the Wildland Firefighter Safety Awareness Study) and the need to have more realistic testing. Anecdotal reports have repeatedly charged that emergency hire firefighters often are not fit enough to

walk the fireline to their work assignment or to work effectively through the operational period. Anecdotal reports from medical units have reported that many firefighters they saw were not physically fit enough to perform the work required. A screening that deals with those three areas of concern would be very beneficial to prospective firefighters and the agency.

Fire Program managers will have to work out testing schedules. **compared** to the Step Test the "Pack Test" takes longer **per test it but lends itself** to testing several/many employees at a time. The requirement for physical fitness testing to be done prior to issuing a fire qualification (red card) has not changed so there is no impact on date of completion. A significant benefit to the "Pack Test" is that employees can practice the test and know that they are capable of passing the test prior to coming in for official testing. This should reduce the need for and impact of repeat testing.

16. Is the use of a treadmill acceptable for retesting?

ANSWER: The "Pack Test" was designed and validated on a flat track. No work has been done to validate the tests on a treadmill (it would require at least a 1% grade to adjust for lack of wind resistance, terrain variation etc. Holding the rail for balance would invalidate the test given on the treadmill and it is likely most would need to hold the rail. There is no reason to increase the cost of testing while increasing the risk of inaccurate results.

17. Is it possible to use other packs (not the bladder bag)?

ANSWER: Yes, the test requires that the pack meet the weight specified for the respective test. Good testing will require that pack weights are verified prior to and immediately following testing.

18. The test is to be conducted in temperatures below 80 degrees. In some geographic locations the temperature exceeds 80 degrees during June when employees would need to be tested. What options are available?

ANSWER: The latest publication draft by Dr. Sharkey does not contain the temperature reference. It does include a heat stress and a recommendation about testing during high heat stress conditions.

19. Are there recommendations on how to manage the logistics of administering the "Pack Test"?

ANSWER: Dr. Sharkey makes recommendations on how to conduct the tests in the interest of test validity and safety. We expect to get additional suggestions after the tests have been used for training and practice.

20. There were several questions pertaining to the liability clause and the PAR-Q form. Dr. Sharkey has suggested the use of the forms to encourage and aid employees to assess their personal health and fitness states prior to. taking the test. The Forest Service will determine if and how forms Such as those 2 are to be used and will include the instructions in the implementation instructions.

21. What is the **reason for omitting blood pressure reading immediately prior to** taking the "Pack Test"?

ANSWER: Use of blood pressure (or similar types of information like heart rate used in the Step Test) violates the EEOC's interpretation of the Americans with Disabilities Act (ADA). Blood pressure was not a parameter in the test or previous testing and has no direct correlation with the ability of employees to safely and effectively perform the tasks of their positions.

22. Were fire medical records reviewed; was a fire medic advisor consulted?

    ANSWER: In 1994-95, interviews were conducted with crew members, safety officers and crew"bosses. KMC and the SHWT continually review medical records, injury reports and other information related to employee injuries and illnesses. we requested advice from physicians, physologist, field workers and others during the development and field evaluation of the test. The NWCG SHWT was also consulted and asked for comments during the development process.

23. Were demographics of the fire organization reviewed?

    ANSWER: Yes, all studies included female subjects and in the field study, we attempted to "mirror" the composition of the work force in terms Of gender, ethnicity, age, height and weight of firefighters. This consideration is mandated by the Federal Uniform Guidelines for Employee Selection procedures.

24. Has the "Pack Test" protocol been reviewed by medical doctors?

    ANSWER: Yes, see response above: American College of Sports Medicine, U.S. Army, etc. None has questioned the test. U.S. Army has conducted studies in which they trained female recruits to hike at 4.4 mph with 75 pounds.

25. Liability; what does the EEOC have to do with it?

    ANSWER: The language for the suggested waiver comes from an EEOC publication that discusses the ADA. The ADA precludes asking questions re: a candidate's health or disability in a pre-employment test. The EEOC suggests this waiver subject to managements, approval.

26. Why use the PAR Q form?

    ANSWER: It is a validated questionnaire that has been shown to substantially reduce risk in exercise tests and training. Developers require that it be used as is. We do not intend to see the responses on the PAR Q, only to confirm that the candidate read and understood what it says. The form considers the major risks - other questions were discarded during the development of the form.

27. Can the Pack Test be used to meet the fitness requirements for Law Enforcement?

    ANSWER: Yes, the Law Enforcement Coordinators for western regions of the FWS agreed to also use the Pack Test as a means to test fitness for LE personnel. Those passing the Pack Test will receive a Level 5 Fitness Rating.

28. Let's say that I start out with a 45 pound pack to do the pack test. I pass the 2 mile mark in under 30 minutes, but it takes me over 45 minutes to finish the 3 mile course. Can I receive a Moderate rating?

    ANSWER: Yes. This would more than demonstrate your ability to perform at a Moderate level.

APPENDIX G

STEP-UP PLAN

The Step-up plan will guide fire preparedness operations and use of emergency preparedness funding. The plan uses data obtained by the U.S. Forest Service from a Remote Area Weather Station (RAWS) located in the sandhills north of Lower Red Rock Lake.

NFDRS Fuel Model T, Red Rock, MT RAWS

PREPAREDNESS ACTION	**BURNING INDEX**				
	0-7	**8-16**	**17-33**	**34-59**	**60+**
Maintain Radio Contact	X	X	X	X	X
Maintain Response Time of: (minutes)	60	60	45	20	20
Fire-ready engine at Refuge Headquarters	X	X	X	X	X
Carry PPE while on duty, wear nomex and boots			X	X	X
Water tender on standby			X	X	X
Tour of duty changed at Manager's discretion			X	X	X
Monitor Forest Service fire frequency				X	X
Detection patrol conditional				X	X

Refuge fire ban conditional				X	
Refuge fire ban mandatory					X

During the Memorial Day, Independence Day and Labor Day holidays move up to the next burning index break point because of the increased risk of human caused ignitions.

If burning index is 50 or greater and lightning is forecast, move up to next burning index break-point because of increased risk of lightning ignitions.

APPENDIX H

Fire Dispatch Plan

APPENDIX I

Fire Agreements

APPENDIX J

WFSA
and
DELEGATION OF AUTHORITY

WILDLAND FIRE SITUATION

ANALYSIS

Incident Name:
Jurisdiction:

Date and Time Completed:

This page is completed by the Agency Administrator(s).

Section I, WFSA Information Page

A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.

B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.

C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.

D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.

E. Fire Name: Self-explanatory.

F. Incident #: Identify the incident number assigned to the fire.

G. Accounting Code: Insert the local unit's accounting code.

H. Date/Time Prepared: Self-explanatory.

I. Attachments: Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I.	Wildland Fire Situation Analysis
To be completed by the Agency Administrator(s)	
A. Jurisdiction(s)	**B. Geographic Area**
C. Unit(s)	**D. WFSA #**
E. Fire Name	**F. Incident #**
G. Accounting Code:	
H. Date/Time Prepared _____@_____	
I. Attachments	

- Complexity Matrix/Analysis *	_____	
- Risk Assessment/Analysis *	_____	
Probability of Success *	_____	
Consequences of Failure *	_____	
- Maps *	_____	
- Decision Tree **	_____	

- Fire Behavior Projections *	_____	
- Calculations of Resource Requirements *	_____	
- Other (specify) * Required ** Required by FWS	_____	

This page is completed by the Agency Administrator(s).

Section II. Objectives and Constraints

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II. Objectives and Constraints

To be Completed by the Agency Administrator(s)

A. Objectives (Must be specific and measurable)

1. *Safety*

   - Public

   - Firefighter

2. *Economic*

3. *Environmental*

4. *Social*

5. *Other*

B. Constraints

This page is completed by the Fire Manager and/or Incident Commander.

Section III. Alternatives

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.

I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III.	**Alternatives (To be completed by FMO / IC)**		
	A	**B**	**C**

A. Wildland Fire Strategy			
B. Narrative			
C. Resources needed Handcrews Engines Dozers Airtankers Helicopters			
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			

G. Risk Assessment **- Probability of success** **- Consequence of failure**	_____ _____	_____ _____	_____ _____
H. Complexity			
I.	**Attach maps for each alternative**		

This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.

Section IV. Evaluation of Alternatives

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of:
pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV.	Evaluation of Alternatives

To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
A. Evaluation Process	**A**	**B**	**C**
Safety Firefighter Aviation Public			
Sum of Safety Values			
Economic Forage Improvements Recreation Timber Water Wilderness Wildlife Other (specify)			
Sum of Economic Values			
Environmental Air Visual Fuels T & E Species Other (specify)			
Sum of Environmental Values			

Social Employment Public Concern Cultural Other (Specify)			
Sum of Social Values			
Other			

This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.

Section V. Analysis Summary

A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) is mandatory.

V. Analysis Summary			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
Alternatives	**A**	**B**	**C**
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			

C. External / Internal Influences

National & Geographic Preparedness Level _____

Incident Priority _____

Resource Availability _____

Weather Forecast (long-range) _____

Fire Behavior Projections _____

VI. Decision

The Selected Alternative is: _____

Rationale:

_____ _____

Agency Administrator's Signature Date/Time

This Section is completed by the Agency Administrator(s) or designate.

Section VII. Daily Review

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

VIII.	**Daily Review**					
To be completed by the Agency Administrator(s) or Designate						
Selected to be reviewed daily to determine if still valid until containment or control						
	PREPAREDNESS LEVEL	**INCIDENT PRIORITY**	**RESOURCE AVAILABILITY**	**WEATHER FORECAST**	**FIRE BEHAVIOR PROJECTIONS**	**WFSA VALID**

Date	Time	By						

If WFSA is no longer valid, a new WFSA will be completed!

VIII. Objectives Final Review

The elements of the selected alternative were met on: _____ _____
Date Time

By:_____
(Agency Administrator(s)

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."

2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.

3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.

4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

		Yes/No	
A.	FIRE BEHAVIOR: Observed or Predicted		
1.	Burning Index (from on-site measurement of weather conditions).	___	___

Predicted to be above the 90% level using the major fuel model in which the fire is burning.

2. Potential exists for "blowup" conditions (fuel moisture, winds, etc.) ___ ___
3. Crowning, profuse or long-range spotting. ___ ___
4. Weather forecast indicating no significant relief or worsening conditions. ___ ___

Total ___ ___

B. RESOURCES COMMITTED

1. 200 or more personnel assigned. ___ ___
2. Three or more divisions. ___ ___
3. Wide variety of special support personnel. ___ ___
4. Substantial air operation which is not properly staffed. ___ ___
5. Majority of initial attack resources committed. ___ ___

Total ___ ___

C. RESOURCES THREATENED

1. Urban interface. ___ ___
2. Developments and facilities. ___ ___
3. Restricted, threatened or endangered species habitat. ___ ___
4. Cultural sites. ___ ___
5. Unique natural resources, special designation zones or wilderness. ___ ___
6. Other special resources. ___ ___

Total ___ ___

D. SAFETY

1. Unusually hazardous fire line conditions. ___ ___
2. Serious accidents or facilities. ___ ___
3. Threat to safety of visitors from fire and related operations. ___ ___
4. Restricted and/or closures in effect or being considered. ___ ___
5. No night operations in place for safety reasons. ___ ___

Total ___ ___

E. OWNERSHIP **Yes/No**

1. Fire burning or threatening more than one jurisdiction. ___ ___
2. Potential for claims (damages). ___ ___
3. Conflicting management objectives. ___ ___
4. Disputes over fire management responsibility. ___ ___

5.	Potential for unified command.		___	___
		Total	___	___

F. EXTERNAL INFLUENCES

1.	Controversial wildland fire management policy.	___	___	
2.	Pre-existing controversies/relationships.		___	___
3.	Sensitive media relationships.		___	___
4.	Smoke management problems.		___	___
5.	Sensitive political interests.		___	___
6.	Other external influences.		___	___
		Total	___	___

G. CHANGE IN STRATEGY

1.	Change in strategy to control from confine or contain.	___	___
2.	Large amount of unburned fuel within planned perimeter.	___	___
3.	WFSA invalid or requires updating.	___	___
	Total	___	___

H. EXISTING OVERHEAD

1.	Worked two operational periods without achieving initial objectives.	___	___
2.	Existing management organization ineffective.	___	___
3.	IMT overextended themselves mentally and/or physically.	___	___
4.	Incident action plans, briefings, etc., missing or poorly prepared.	___	___
	Total	___	___

Signature_____

Date_____ **Time**_____

DELEGATION OF AUTHORITY

Red Rock Lakes National Wildlife Refuge
Lakeview, Montana

As of (Time) and (date), I have delegated authority to manage the (Fire/Incident Name and Fire Number) , Red Rock Lakes National Wildlife Refuge, to Incident Commander (Name) and his incident management team.

As Incident Commander, you are accountable to me for the overall management of this incident including it's control and return to local forces. I expect you to adhere to relevant and applicable laws, policies, and professional standards. While the suppression of the fire is your primary task, you are expected to do so in a manner that provided for the safety and well being of involved personnel. Consideration for the needs of local residents and communities is essential for successful management of the incident.

I am assigning (Name) As the line officer representative to act as liaison and provide any help you need. (S)He is authorized to speak for me in the event a decision is needed.

My specific considerations for management of this fire are:

1. Ensure the safety of firefighters, visitors, and public.
2. Protect private and refuge property to the extent possible
3. Minimize damage to environmental resources
4. Key resource considerations are: protecting rare, threatened, and endangered species: preserving as much wildlife habitat as possible; avoiding wildlife entrapment situations; protecting cultural resources; and limiting degradation of the Refuge's aesthetic values.
5. Restrictions for suppression actions are no earthmoving equipment (dozers, discs, plows, graders) without approval of the Project Leader.
6. Manage the fire cost-effectively for the values at risk.
7. Provide training opportunities for Service personnel when ever possible in order to strengthen our organizational capabilities.

Signed: _____ Date:
Project Leader

APPENDIX K

Prescribed Fire Complexity Analysis

PRESCRIBED FIRE COMPLEXITY ELEMENT RATING CRITERIA

Complexity elements are used to define the relative complexity of a prescribed fire project. For the 8 complexity elements listed, users assign a complexity score of 0, 1, 3, 5, 7 or 9, based upon the rating criteria described for each numeric score. Even numbers or numbers greater than 9 are not permitted. If a specific prescribed burn does not precisely match the stated criteria in every respect, a station will have to use its best judgment determine which rating is most appropriate. Each prescribed burn does not have to meet all listed rating criteria for a particular numeric score to qualify for that rating. Each higher rating category includes all the rating criteria listed for the previous categories.

These rating criteria will be used for all management ignited prescribed fires (prescribed burns), regardless of size. The complexity score will be included on the Fire Report (DI-1202) in the "Remarks" section. Post-fire complexity ratings are used to compile a summary complexity score for the normal prescribed fire year, which is used in the FIREPRO budget analysis for funding and staffing needs.

COMPLEXITY ELEMENTS

1. POTENTIAL FOR ESCAPE:

Score	Criteria
[0]	No potential for prescribed fire escape. Burn unit surrounded by non-burnable fuel or water.
[1]	Little potential of spot fires outside burn unit. If occurring, only one to two totaling no more than 0.25 acre. Spots can be controlled utilizing on-site holding forces.
[3]	Potential for multiple spot fires (more than two) outside the burn unit totaling less than 1 acre, but still controllable utilizing on-site holding resources. One or two dangerous fuel concentrations exist near the burn unit perimeter, and are expected to result in limited torching and spotting potential.
[5]	Potential for multiple spot fires outside the burn unit totaling more than 1 acre, requiring greater than average holding capability along certain sections of burn perimeter. Additional holding resources may be needed to control if escape occurs. Fuel outside burn unit is continuous, with limited fuel breaks. Engines and heavy equipment are primary suppression tools.
[7]	An escaped fire will exceed the capability of the holding resources on site. Additional resources will need to be requested for suppression. Escaped fire will cause implementation of contingency plan, and prescribed burn will be declared a wildfire. Fuel outside burn unit may be continuous and heavy with no fuel breaks making suppression efforts difficult. Engines and heavy equipment are primary suppression tools. Probability of Ignition greater than 70 percent.
[9]	Good potential for multiple fire escapes. An escaped fire will exceed the capability of the holding resources on site and additional resources will need to be requested. Escaped fires will cause implementation of contingency plan and prescribed burn will be declared a wildfire. Fuel outside the burn unit is extensive and heavy, making suppression actions difficult. Prescription calls for fireline intensity and fuel moisture in the primary fuel model that are known to cause serious spotting potential. Probability of Ignition greater than 85 percent. Wind speeds at the upper end of prescription.

2. VALUES AT RISK

Score	Criteria
[0]	No risk to people, property, cultural and natural resources, either inside the designated burn unit or in the event of fire escape.
[1]	Burn is in an area infrequently visited by people and contains no historic structures, buildings, sensitive biological communities, T&E species, or habitats that could be damaged by prescribed fire. The area adjacent to the burn may contain a few locally significant natural or cultural resources, or structures that could be damaged by fire escapes.
[3]	Burn is in an area occasionally visited by people, and may be adjacent to a primary field unit road. The burn unit contains structures, cultural resources, sensitive biological communities, or T&E habitat that must be protected from fire.
[5]	Burn is in an area that receives moderate use. Public safety is a major concern addressed in the burn unit plan, but still requires a minor commitment of project resources. The unit may contain several significant structures; there may be one or two primary natural or cultural resources (as identified in the station fire management plan) inside or immediately adjacent to the burn unit which must be protected from fire. - OR - the area adjacent to the burn unit contains one or two cultural or natural resources, or structures valued between $50,000 and $250,000 that could be threatened by fire escapes.
[7]	Burn is in an area that receives moderate use, and protecting public safety requires a modest commitment of project resources. The burn unit may contain several significant structures, and contain or be immediately adjacent to several sensitive biological communities or habitats (as identified in station fire management plan) that must be protected from fire. - OR - the area adjacent to the burn unit contains three or more cultural or natural resources or developed sites with structures valued between $250,000 and $500,000 that could be threatened by fire escapes.
[9]	The burn unit is in an area of concentrated public use, and protecting public safety requires a major commitment of project resources. The unit may contain several major structures (such as residences, historic buildings) and there may be critical natural or cultural resources (such as threatened or endangered species, or major archeological artifacts) inside the burn unit that must be protected from fire. - OR - the area adjacent to the burn unit contains critical natural or cultural resources or developed sites with structures valued at more than $500,000.

3. FUELS/FIRE BEHAVIOR

Score	Criteria
[1]	Fuels are uniform, and fire behavior is easily predicted using the standard fire behavior models and prediction systems (BEHAVE PROGRAM). Terrain is mostly flat, or the slope is uniform.
[3]	Fuels within the primary model vary somewhat in loadings and arrangement, but are still well represented by one of the standard fire behavior fuel models. There may be small areas of secondary fuel types present, mostly away from the burn unit perimeter. The terrain contains low relief, and slope and aspect cause minor variations in fire behavior. The fire behavior variations present no difficulties in carrying out the burn, and the predominant fire behavior still can be predicted easily under most prescription conditions.
[5]	Considerable variation exists within the primary fuel complex. Prescriptions may be based on two fuel models, or may require a customized model in addition to or in place of a standard model. A few areas of unusual fuel concentrations or atypical fuels not well represented by the prescription-based models may exist on or near the burn unit perimeter. The terrain contains significant relief,

but the variations present only minor control problems, and no problems in meeting burn unit objectives. Fire behavior can still be predicted using standard fire behavior prediction systems.

[7] Major variations in the fuel complex require **two or more** fuel models, and may require several customized models. High fuel concentrations and atypical fuels not well represented by the prescription-based models may be common on or near the burn unit perimeter. The terrain encompasses two or three major vegetative communities through a broad elevational gradient. Variations in slope and aspect have major effects on fuels, fire weather and fuel moisture. The resulting variations in fire behavior may present moderate fire control problems and minor problems in meeting the overall burn unit objectives. Fire behavior cannot be predicted well using standard fire behavior prediction systems without application of adjustment factors.

[9] The burn unit contains highly variable fuels throughout, making it difficult to utilize standard or customized fuel models. The terrain encompasses more than three major vegetative communities through an elevation gradient so broad that more than one climate zone may be present. Wide variations in slope, aspect and elevation have major effects on fuels, fire weather and fuel moisture. The resulting variations in fire behavior may present major fire control problems and moderate problems in meeting overall burn unit objectives. Fire behavior cannot be predicted well without the aid of local experts (Fire Behavior Analysis).

4. FIRE DURATION

Score	Criteria
[1]	Entire burn unit will be burned in one burning period. Some minor residual burning may continue inside the unit, but requires no continued resource commitment. Primarily 1-hour fuels.
[3]	Complete burnout of burn unit requires 1 to 3 days. Some minor residual burning may continue inside the unit, but requires no continued resource commitment. Primarily 10-hour fuels.
[5]	Complete burnout of burn unit requires 2 to 3 days. Significant residual burning inside the burn perimeter may continue for up to 3 days, requiring small holding crew. Primarily 100-hour fuels.
[7]	Complete burnout of burn unit requires 3 days to 1 week. Significant residual burning inside the burn perimeter may continue up to another week, requiring a holding crew on site during the burning period. Primarily 1,000-hour fuels.
[9]	Complete burnout of burn unit requires more than 1 week. Significant residual burning may continue for up to another 3 weeks along most of the burn unit perimeter, requiring a complete holding crew on site.

5. AIR QUALITY

Score	Criteria
[1]	Burn is remote from developments or visitor use areas or is of such small size that smoke impacts are insignificant. No critical targets are present. Critical targets are areas that are unusually sensitive to smoke impacts. These include areas such as airports, highways, air quality non-attainment areas, and hospitals in which health and safety are quickly and severely impacted by even minimal amounts of smoke, targets that already have an air pollution or visibility problem, and any targets where the impact of smoke will be compounded by the presence of emissions from other sources. Burning is outside the non-attainment areas, and RACM/BACM eliminates any impacts to these areas.
[3]	One or more minor developments or visitor use areas may experience noticeably impaired visibility and increased particulate concentrations, but not in excess of secondary Federal standards. The impairment is expected to last no more than 3 days. No critical targets are present. There are no impacts to non-attainment areas.

[5] Several communities or visitor use areas may experience significantly impaired visibility (as defined in State, county, or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last no more than 1 week. Not more than one health-related complaint is likely to be received from health or medical authorities. No critical targets are present. Smoke trajectory is important, but broad.

[7] One town (more than 20,000 people) or one major visitor use area may experience significantly impaired visibility (as defined in a State, county or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last not more than 1 week. One to three critical targets are present. Smoke trajectory is critical. Mixing height and transport wind speed may be important.

[9] Several towns (each of 20,000 people or more) or several major visitor areas may experience significantly impaired visibility (as defined in State, county or field station visibility standard) or particulate concentrations exceeding secondary Federal standards. The impairment is expected to last more than 1 week. Any impact likely to result in a violation of a primary Federal air quality standard would also qualify. Smoke trajectory, mixing height, and transport wind speed are critical.

6. IGNITION METHODS

Score **Criteria**

[1] Burn is ignited using drip torches, fusees, or other simple ground methods. Ignition requires not more than two personnel. Ignition patterns are simple, with no chance for confusion or hazardous situations to develop.

[3] Burn is ignited using simple ground methods or Terra Torch device (or equivalent). Ignition requires three to four personnel who may work in small teams igniting separate areas simultaneously. Ignition patterns may be complex enough to require detailed planning, but there is only minor chance of confusion. Ignition team is not expected to become involved in hazardous situations.

[5] Burn is ignited using a combination of ground methods, or both ground and aerial methods. Ignition requires four to six personnel working in teams to ignite separate areas simultaneously. Burn and ignition complexity requires separate position for ignition specialist. Ignition patterns require detailed planning, coordination between teams, and considerable attention to avoid confusion. Ignition teams may be exposed to hazardous situations for short periods.

[7] Ignition methods are tailored to accomplish different results in different sections of the burn. Burn unit may be composed of several fuel types requiring different ignition techniques and patterns. Ignition team(s) is composed of six to eight personnel, who may ignite separate areas simultaneously. Several ignition specialists may be required for different segments of the burn. Ignition methods require detailed planning and coordination often including an ignition specialist in aerial command post. Ignition teams are frequently exposed to hazardous situations due to fuels, fire line intensity, and complex terrain. Ignition methods or patterns are subject to revision by burn boss to achieve desired results or due to changing conditions.

[9] Burn requires a combination of complex aerial and ground techniques, often including helitorch, in complex, hazardous terrain and fuels. Ignition team is composed of more than eight personnel. Ignition methods require detailed planning by experts with extensive experience in specialized techniques. Ignition methods are subject to frequent revision by burn and ignition bosses due to changing or uncertain conditions. Detailed coordination is imperative to avoid placing team members in unacceptably dangerous situations.

7. MANAGEMENT TEAM SIZE

Score	Criteria
[1]	Burn team consists of two to three personnel, with the burn boss holding several overhead positions.
[3]	Burn team consists of four to six personnel, including separate positions for Burn Boss and Holding Specialist.
[5]	Burn team consists of seven to nine personnel, including separate positions for Burn Boss, Ignition Specialist, and Holding Specialist.
[7]	Burn team consists of 10-12 personnel, including Burn Boss, Ignition and Holding Specialist, Aircraft Manager (aerial ignitions), and a Fire Weather Observer.
[9]	Burn team consists of more than 12 personnel, including Burn Boss Type I, Holding Boss, Ignition Specialist, Aircraft Manager, Weather Observer, and several ignition and holding foremen.

8. TREATMENT OBJECTIVES

Score	Criteria
[1]	Objectives are limited to fuel reduction or maintenance burning and are easily achieved (e.g., removing cured grasses from grasslands or field maintenance). Prescriptions are broad and encompass safe burning conditions.
[3]	Objectives are limited to dead and downed fuel reduction, or simple habitat restoration projects involving minor changes to vegetation. May involve two or three different fuel models. Objectives are easy to achieve using relatively low-intensity surface fires and simple burning patterns. Range of acceptable results for the burn objectives are broad.
[5]	Objectives include dead and downed fuel, and live fuel reduction burns or change to structure of vegetative/habitat communities. Also include habitat conversion projects requiring changes in the composition of two or more vegetation types. Objectives and results are broad and could be moderately difficult to achieve, and may often require moderate intensity fires involving living fuels. Burning patterns are moderately complex. Flame lengths or scorch heights are critical to meet burn objectives.
[7]	Objectives include living and dead fuels. Include habitat restoration projects requiring changes in the structure and composition of two or more vegetative habitats. Narrow burn parameters (prescription) fire behavior, smoke dispersal, operational constraints, and other burn criteria present a limited opportunity of project success with a single burn. The chance of success is heavily dependent on careful planning and precise timing.
[9]	Objectives include living and dead fuels. Fuel reduction, ecological considerations, and political or operational constraints may be conflicting, requiring careful prioritization of objectives and expert planning. The prescription may require a combination of different fire intensities that makes it difficult to achieve objectives. The prescription criteria and window of opportunity are narrow. Burn objectives are specific, and range of results narrow. Project includes a major change in structure and composition of burn area. The prescription requires burning under risky conditions that could lead to fire escape.

Prescribed Fire Complexity Worksheet

Using the attached criteria, rate each element on a scale of 0 to 9, then multiply by the weighting factor (shown in parentheses in first column) to determine the weighted subvalues. Add the subvalues to determine the total weighted value which is used to determine the complexity of the prescribed burn.

PRESCRIBED FIRES:

COMPLEXITY ELEMENT/ (WEIGHTING FACTOR)	RATING VALUE	WEIGHT SUBVALUE	LOW BURN COMPLEXITY	HIGH BURN COMPLEXITY
1. Potential for escape (10)			Very low probability.	High probability.
2. Values at risk (10)			Very little risk to people, property, resources.	Great risk to people, property, resources.
3. Fuels/fire behavior (6)			Mostly uniform and predictable.	Great variability & unpredictability. Prescription includes very low fuel moisture conditions.
4. Fire duration (7)			Fire generally of short duration & require little management.	Fires of long duration & require continuous management.
5. Smoke/air quality (7)			Smoke impacts are low or insignificant.	Smoke sensitive areas frequently affected.
6. Ignition methods (3)			Simple & rarely hazardous.	Highly technical or frequently hazardous.
7. Management team size (3)			Burn requires a few generalized positions.	Burn requires large team of separate, specialized positions.
8. Treatment objectives (5)			Objectives simple & easy to achieve. Prescriptions are broad & encompass safe burning conditions.	Objectives are difficult to achieve. Prescriptions are restrictive or burning conditions are risky.
Total Weighted Value:				

Low Complexity: 50 - 115 Total Weighted Value Points - Management Level: RXB3
Normal Structure: 116 - 280 Total Weighted Value Points - Management Level: RXB2
Complex Structure: 281 - 450 Total Weighted Value Points - Management Level: RXB1

Prepared by (RXBB/FMO) Date

APPENDIX L

Fire Monitoring

RECOMMENDED FIRE MONITORING STANDARDS

The following are the recommended standards to be used when planning, implementing, and evaluating prescribed burns. These should be viewed as minimum values to be monitored and the information contained in this check list incorporated into a monitoring record sheet.

Planning and Preparation

Environmental Conditions Prior to the Burn

____ Photo Points Established

____ Fuel

- ____ Model(s)
- ____ Loading (By Size Class)
- ____ % Cover (Type/Model)
- ____ Continuity
- ____ Crown ratio
- ____ Depth of Fuel Bed
- ____ Other

____ Air Temperature (Maximum - Minimum to develop trends)

____ Relative Humidity (Maximum - Minimum to develop trends)

____ Wind Speed and Direction (Eye-level/20 Foot)

____ Fuel Moisture

- ____ Dead Fuel Moisture (Use of Fuel Sticks and/or Drying Ovens highly recommended)
- ____ Live Fuel Moisture (Fuel Models 2,4,5,7,10)

____ Soil Moisture (Dry, Moist, Wet)

____ Drought Indicator (Track One or More)

Execution

Environmental Conditions During the Burn

____ Date/Time

____ Air Temperature (Every 30 minutes)
____ Relative Humidity (Every 30 minutes)
____ Wind Speed and Direction (Eye Level) (Every 30 minutes)
____ Cloud Cover

____ Fuel Moisture (Indicate How Determined: Calculated, Actual)
- ____ Dead Fuel Moisture (Using above values, calculate every 30 minutes utilizing Tables and Worksheets, Nomograms, BEHAVE, etc.)
- ____ Live Fuel Moisture (Fuel Models 2,4,5,7,10 - Collect immediately prior to the burn and evaluate later)

Fire Behavior

____ Flame length (Head, Flank, Backing)
____ Rate of Spread (Forward, Flank, Backing)
____ Resistance to Control
____ Spotting Distance

Smoke/Air Quality

____ Mixing/Dispersal (Good, Fair, Poor)
____ Trajectory of Column (Surface/Upper Level)
____ Duration (Active Burning/Smoldering)
____ Problems

Note: It is recommended that photos be taken to document smoke dispersal.

APPENDIX M

Fire Effects

RESERVED

Currently included in Appendix A

APPENDIX N

Montana / Idaho Airshed Group Operating Guide